MEDICINE IN MODERN SOCIETY

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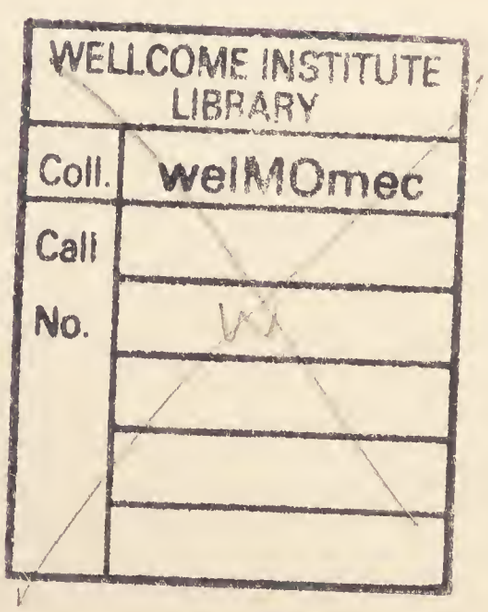

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TO

PROFESSOR AND MRS. ULRIC DAHLGREN

PREFACE

MEDICINE IN MODERN SOCIETY grew out of the author's belief that the history of medicine is in reality an epitome of the history of civilization and should form a part of every man's culture. This volume has been developed from a series of lectures known as the Vanuxem Lectures which the author had the honor of delivering at Princeton University.

In addition to pointing out the peaks of medical history, the volume covers also those subjects that are interesting and agitating not only the medical profession but also the laity. The layman hears the words allergy, antitoxin, vaccine, viruses, hormones, ductless glands, basal metabolism, blood pressure, but he has no clear conception of their precise meaning. Here an attempt is made to give the layman a truer idea of these absorbing subjects.

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MEDICINE IN MODERN SOCIETY

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CHAPTER ONE

MEDICINE — ART AND SCIENCE

From the beginning of the Middle Ages to the end of the seventeenth century, Latin was the language of scholars. Every man who pretended to a good education was able to read and to write it. The classics of the Greeks, the medicine and the philosophy of the Arabs and the Jews were all translated into Latin. For that reason these books, including the medical works, were the common property of educated men. A general lay interest was facilitated by the fact that men did not to any considerable extent write new medical texts, but contented themselves with those handed down from the past. Whereas today a medical book is antiquated in five years, our medieval ancestors used the writings of Hippocrates, who lived about 400 B.C., of Galen 100 A.D., and a few others of somewhat later date. Even in the sixteenth and seventeenth centuries the works of these ancients were the regulation textbooks of the medical schools together with those of the Arabians of the early Middle Ages.

A cultured man's library would be very likely to have these books on its shelves side by side with Aristotle, Plato, St. Augustine, St. Thomas Aquinas, Roger Bacon, and Arnald of Villanova. It is sometimes difficult to say whether an ancient or medieval writer was

or was not a physician, for he wrote on medical matters as well as on philosophy and theology. Examples are the Roman Celsus, Roger Bacon, Grosseteste, Albertus Magnus.

After the invention of printing and, more particularly, after the year 1500, when medical men began to write new and original texts, less philosophical and more practical, the literate layman ceased his interest in medical writings not only because medical books had become more technical but also because his own branch of learning, whatever it might be, was demanding more of his time and thought. And so it happened that it was no longer part of a general culture to know the more important medical writings. Gradually the gulf between the layman and the physician widened until the latter came to live in a closed sphere which the former did not care to enter. And in our own day the cultured layman knows a good deal about medicines and almost nothing about medicine. This is a serious defect of our present civilization—as well as any other learned profession, if not better, medicine represents the culture of our time.

When we compare theology with medicine, from the chronological point of view, we find the situation in the former is more or less the reverse of that obtaining in the history of medicine. Throughout the Middle Ages when medical writings were within the reach of the intelligent layman, the Bible was a closed book. The reading of it was discouraged by the Church, which for a long time bitterly opposed the translation of the Scriptures.[1] Not until the beginning of the sixteenth century was an attempt made, by scholarly clerics like Wycliffe, Colet, Erasmus, Lefèvre and Luther, to

[1] George V. Jourdan, *The Movement Towards Catholic Reform in the Early Sixteenth Century*, London, 1914.

awaken a general interest among the people in the biblical texts and in questions of interpretation. After the Protestant Reformation interest became very active in the Bible and in doctrinal matters, an interest that profoundly influenced the development both of Christianity and of general literature, especially among the English-speaking peoples. Today the layman often knows his Bible as well as his pastor and may be quite as familiar with the Church Fathers, the medieval heresies, the Inquisition and the causes of the Reformation. Moreover, in many denominations both the ecclesiastic and the layman meet in joint convention at periodic church congresses and together discuss questions of creed, missions and general policy. In medicine or law there is nothing comparable to this.

Unlike medicine and theology, law, at least in its civil aspects, was in the Middle Ages largely a lay occupation and even today in our country the highest legal office, that of Justice of the Supreme Court of the United States, may be filled by a layman, and in New Jersey laymen actually sit on the highest tribunal of the state. Law became a learned profession toward the end of the twelfth century, first at the University of Bologna, then at Paris, later at other medieval universities, but it was at no time except in the case of canon law far removed from the public's interest.[2] Today the intelligent layman has a deep interest in the law, especially in business and constitutional law; he may even know something of the law of nations. Some of the courses

[2] The question whether law or medicine is the higher pursuit was much debated in the Middle Ages as well as later. While Cornelius Agrippa satirized this dispute for precedence by saying that law precedes medicine as the thief precedes the executioner on the scaffold, many others had no doubt as to the superiority of medicine over law, even over canon law. Thus Hippolitus Obicius (Venice, 1605; quoted by Lynn Thorndike, *The Romanic Review*, XXVII, July-December 1936), says that medical men like philosophers employ reason, while lawyers rely on authority.

given in high schools and colleges on political economy and on history deal with the fundamental problems of the law. Should not medicine occupy a similar place in education and culture? Is it not just as important for the cultured man to know something of the history of the circulation of the blood, of vaccination, of anesthesia and antisepsis, of vitamins and hormones, as it is to know the story of the Punic Wars, the Conquest of Mexico or the names of the Kings of France?

The layman is certainly interested in medicine. I rarely ride in a street car without hearing some persons talk about sickness or doctors, and the same thing is true in the case of social gatherings. In such circumstances the doctor often hears the most astounding statements from otherwise well informed persons. Evidently their education is incomplete in matters that concern them very nearly and about which they want to be informed. I believe the time has come to broaden the educational basis of our youth in high school and college by giving them survey courses in the history of medicine analogous to those given in the history of art. In the beginning such courses are probably best given by broadly educated medical men but in time there will no doubt arise a class of scholars not trained as physicians but as medical historians who will become the academic teachers in this field. Of this new type of scholar George Shryock, formerly of Duke University and now at the University of Pennsylvania, is an example.

Every sick individual presents to the physician two clearly defined although related problems—the diagnosis and the treatment of the disease, and the appraisal and treatment of the patient as a human being. The diagnosis and treatment of the disease is a scientific

procedure often as exacting, as rigorous as a problem in the natural sciences or in engineering. It comprises several steps, the first being the obtaining of a history. The doctor with infinite patience must question the sick individual so as to elicit both the things the patient wants to tell and those he wants to conceal. Some persons when consulting a doctor for the first time take delight in refusing to answer questions truthfully or completely, thinking and often saying that it is the doctor's business to find out what is wrong with them without their help. This reminds me of a story told of the great Iron Chancellor. He had had many physicians, all of whom he discharged. Finally he summoned a Doctor Schweninger, who began to ask him many questions. Impatiently Bismarck said to the doctor, "You should not ask so much—you should know what ails me without questioning." "Your Highness," answered the doctor, "I would suggest you call a veterinarian; he asks no questions." Bismarck ever after obeyed Doctor Schweninger.

The doctor should know how to frame his questions so as to penetrate behind the veil created by the patient's wilfulness or shame, and he should know how to discard or to ignore nonessentials with which many a patient fills his story.

After the history has been obtained—and a good history usually provides a lead toward the diagnosis and the further studies required—the doctor begins the examination of the patient. This first of all involves a thorough physical examination which at the hands of a properly trained practitioner is a highly refined ritual during which nothing is left unexplored. The physical examination includes the whole body as well as the simple data of weight, height, temperature, pulse, respiration and blood pressure. Such an examination

which in every sense is a scientific procedure must then be supplemented by various laboratory tests which are exemplifications of science of a high order. Better than anything else they illustrate the tremendous advances medicine has made in scarcely more than one human life span. The laboratory investigation is often done in our day by others than the physician, by highly trained technicians. However, the reports from the laboratory must be appraised by the physician, who knows their meaning and is the final arbiter of their value in any given case. The tests are to a large extent quantitative and make use of instruments of precision. They may even involve experiments on lower animals. For example: the decision may be in doubt whether a given disease is tuberculosis or not. When the ordinary tests fail, as they sometimes do, the physician asks the laboratory personnel to inject a guinea pig with material obtained from the patient—sputum, fluid from the spinal canal or from the chest or abdomen. If the disease is caused by the tubercle bacillus the guinea pig will in due time develop tuberculosis and this constitutes unequivocal proof of the nature of the patient's disease.

The next step is the diagnosis. This has all the elements of a detective story. The doctor, like a true Sherlock Holmes, must assemble his clues, the facts of the history, of the physical examination and of the laboratory, and fit them together into a clear, representative picture. But, unlike the detective who is done when he has found the guilty party, the medical detective must not only place the guilt in the organ or tissue where it belongs, he must also provide the remedy. That too may mean lengthy deliberation. Should the disease be treated medically or surgically? While as a rule that question is easily answered it may in a given case be the

most difficult one conceivable, imposing a truly awful responsibility upon the conscientious doctor. The choice made, the subsequent treatment involves many problems of detail depending upon the seriousness or the obstinacy of the disease. All in all, diagnosis and treatment often require the highest intellectual activities of which man's brain is capable.

What I have so far said refers to the science of medicine. I can illustrate this a little more fully by asking the reader to visit with me the wards of a hospital so that I may show him how the doctor of today proceeds to study a patient.

In the first bed lies John Davenant, twenty-four years of age, a worker in a hosiery mill, who has a severe headache, no appetite, is feverish and restless. The young intern goes to the bedside, examines the man from head to foot, then takes a little blood from the finger into a fine glass tube and puts a few drops upon a piece of white paper. He goes to the laboratory and returns in a short time to report that the Widal test for typhoid fever is positive and that the white blood cells are diminished in number. These data together with the history and the physical examination warrant a diagnosis of typhoid fever. The patient is isolated in a fever ward and the nurses and doctors take the precautions they have been taught—they wash their hands carefully and are vaccinated against typhoid fever if they have not been vaccinated within two or three years.

Typhoid fever is a rare disease nowadays. The very first question we ask after making the diagnosis is, "How did the patient acquire it?" The disease is not carried by the air, it can only come from some other case, either directly or indirectly. Before filtration it was usually conveyed by the drinking water which had

become contaminated with typhoid fever bacilli through the discharges of typhoid fever patients. That source, however, has now been largely eliminated through filtration or chlorination of the water supply. How did John Davenant then acquire his disease? As he himself has no notion, we investigate his activities for three or four weeks prior to his entrance into the hospital and learn that three weeks before he was taken ill he had attended an American Legion picnic. We further ascertain that a number of other participants are down at home or in hospitals with typhoid fever. The water is at first suspected but examination of the source from which the picnickers drew their supply proves it to be uncontaminated after careful testing by the bacteriological laboratory. What did the picnickers eat? Ice cream, sandwiches and potato salad. There is no ice cream left, no potato salad. The ice cream, however, came from a reliable firm that supplied homes and drug stores at the same time as it supplied the picnickers. One further fact has now been developed, namely, several persons are ill who were not at the picnic but ate some of the food brought home by their parents. John Davenant and several others who had not attended the picnic had eaten only potato salad, and so the suspicion falls on the salad. The Board of Health locates two women who made the salad in a big washtub. They are examined and are found to be typhoid carriers. They are constantly discharging with their bowel contents living virulent typhoid germs which got on the hands and which became mixed with the salad, and so the cause of the outbreak stands revealed—something quite impossible of achievement prior to the era of scientific medicine.

An interesting personal experience of a goodly number of years ago is germane to this subject. One winter

day when the snow was deep upon the ground I was called by the late Doctor O'Day to come to Dover, Delaware. Doctor O'Day drove me seven miles into the country to an isolated farmhouse where a pathetic sight met my eye. The room we entered had the appearance of a shambles. All the family of the farmer excepting a son were down with typhoid fever. One or two—I do not clearly remember—had already died. The well son had recently arrived from Georgia, whence he had been summoned by his despairing family. There was at the time no typhoid fever in or about Dover. The State Board of Health had declared the sample of the well water submitted to be contaminated. Search had then revealed that the coping of the well nearest the stable was broken, enabling sewage to drain into the well. No further investigation had been made, yet the problem was not solved. Cattle do not have typhoid fever; furthermore contamination is not synonymous with the presence of typhoid bacilli in the drinking water, so I proceeded to make further inquiries which revealed the following important facts:

The family had originally come from Pennsylvania, about seven years previously. During the late autumn a cousin from Butler, Pennsylvania, whose wife had died from typhoid fever, had paid a visit to the farmhouse. It was about the time when Butler had been having a serious typhoid epidemic. The conclusions from these revelations were obvious. The visitor had undoubtedly been a typhoid carrier and had contaminated either the drinking water of the well or the food.

To return now to John Davenant—while we have solved the main problem in his case, namely how he acquired his disease, we are left with the larger problem: how to dispose of the typhoid carriers? It seems

that one of the women had had typhoid fever twenty years ago and had considered herself entirely well ever since. How is it she asks, that I have typhoid fever germs in me when I have not been sick for twenty years? Science gives the answer and says as the result of many laboratory studies that the typhoid bacilli survive in her gall bladder. They may even be alive in a person who has not had typhoid fever but has been exposed to it. Mrs. Jones is an intelligent woman. She realizes that she is a menace if she does any cooking and wants everything done that can render her harmless to other persons. Medical treatment in the past has been found inadequate to rid such typhoid carriers of their typhoid germs. Success in a number of instances has, however, attended the removal of the gall bladder. Mrs. Jones was advised to have that done and she acquiesced. For a time she did not discharge any typhoid bacilli and then to the great disappointment of the Board of Health and herself, they reappeared in the excreta. This is unusual. It means that Mrs. Jones will have to be kept under observation by the Board of Health and not be allowed to do any handling of food. If her circumstances compel her to cook for her own family, the best thing in addition to instructing her how to disinfect her hands, is to vaccinate her family against typhoid fever.

In another bed is a man of fifty years who has just been admitted in a state of unconsciousness. He was picked up on the street and there is no history of any kind. His eyeballs are sunken in their sockets, his skin is cold and relaxed, his breathing unusually deep. A peculiar odor pervades the air about him. The man is evidently in a desperate state and if something is not done promptly he will die. The experienced physician suspects diabetic coma. Urine is at once drawn from

the bladder and blood from the arm at the elbow. Examination of the samples proves that the tentative diagnosis is correct. We now immediately inject insulin and that together with other measures brings the patient back to life. Prior to 1922, the year in which insulin was discovered, virtually everyone who fell into diabetic coma died. Although diabetes is common, in fact it appears to be on the increase, deaths from coma are exceedingly rare and patients live almost the normal span of life—something that happened but rarely in pre-insulin days.

Let us now go into the children's ward where a new patient has just been admitted, a girl of fifteen. The mother says the child has been complaining of severe headache, has uttered piercing cries and has vomited. A young man in white comes and draws off with a syringe and fine needle a little fluid from the spinal canal of the child and takes it to the laboratory. After a short time he returns and injects some fluid—antitoxin—into the child's spine and into a vein and tells the mother, "Your daughter has meningitis but I think we can cure her." That is what happens.[3]

These cases illustrate what I mean by the science of medicine. The larger the field occupied by scientific methods the nearer medicine approaches a true biological science—and in that direction it is surely tending. And the degree to which it does this, to that degree the art of medicine becomes less important. Yet the art of medicine will never pass into nothingness, for it deals with the psychic element of disease; it deals with the patient as a personality, and that will never be wholly within the control of pure science. We can tell fairly well from inspection of a pneumonic lung or a

[3] Of late this disease when not due to the tubercle bacillus has been treated quite successfully with the widely publicized drug sulphanilamide.

cancer of the stomach or a tumor in the brain what the symptoms were during life, but no kind of study of the brain after death can tell us what anxieties and apprehensions disturbed its owner while he lived. And while he is living we can only surmise them.

As an element of practice the appraisal of the patient as an individual, the second phase of the problem presented by the diseased patient, antedates medical science by thousands of years. Because it cannot be learned from books or by study with the microscope or the test tube, it has always been called an art and much has been written about it ever since Hippocrates said *Ars longa*—meaning thereby that to learn the art of medicine required a long time.

What do we mean by the word art and what significance has the word for medicine? As defined by the dictionary, art involves the idea of skill based on talent or long practice. It also has an emotional content to which art gives expression. Art furthermore is creative —whence music, the plastic arts, literature are preeminently representative arts. Fowler,[4] in order to distinguish science and art, says, "Science knows, art does." Science is a body of connected facts, an art is a set of directions. The facts of science are the same for all people, circumstances and occasions; the directions of art vary with the artist and the task. But the direction is not always clear—we speak of the art of self-defense and of the boxer's science.

From all this it is apparent that the word art conveys more than a single meaning and that, while medicine obviously does not fulfil the categories of a creative art, it is an art in the sense of skill based on practice and

[4] *A Dictionary of Modern English Usage*, New York.

intuition. And it is in that sense in which the word is used when we speak of the art of medicine.

Let us see now where medical art enters in the appraisal of the patient. As there are no two fingerprints alike, so there are no two individuals alike in their reactions to disease. These reactions are both physical and psychic—the former are apprehended by the scientific methods of examination of which I have spoken, the latter are beyond quantitative analysis—they are apprehended by a process that partakes of intuition. A pertinent story is told of the great London surgeon Abernethy. He was called to a duchess who had fallen and dislocated her shoulder. It was before the days of anesthesia. Abernethy had diagnosed the dislocation and at the same time had taken note of the ultrasensitive nature of his ducal patient. "Your Grace," he said in a rough voice, "I perceive you're drunk." The startled duchess fainted and during the faint Abernethy reduced the dislocation. One can speak of the speedy reduction of the dislocation of the shoulder as an art, but the art of medicine is more truly exemplified by the mental processes in Abernethy, by his intuitive comprehension of the needs of the situation.

There are persons who speak disparagingly or at least only tolerantly of the so-called bedside manner. When it is natural and not assumed then it is a part of the art of medicine and has a wonderful influence upon the suffering and apprehensive patient. It quiets him, awakens his confidence and fills him with hope. One of the most trying situations in life is the moment before a patient is anesthetized for a serious operation. The understanding family doctor then has the opportunity of practising the art of medicine—by his mere

presence and by an encouraging word he facilitates the patient's abandonment to the dreaded unknown.

The basic element in the art of medicine is the psychologic insight into the patient's mentality. This is of such fundamental importance that no physician today can practise successfully without knowing something of the new psychoanalytic approach or of psychiatry, since a large number of diseases of modern man belong to that great class called the neuroses.

The laity and many physicians as well think of neurosis as something by itself, as apart from organic disease. It is true nevertheless that a neurotic element is present in many organic diseases and nearly constantly in those of a chronic nature. The majority of civilized human beings are at one time or another a prey to neuroses, to those disturbances that cannot be discovered by ordinary methods of diagnosis, by means of instruments of precision, but are revealed to the physician by his understanding of human nature and to the patient by his own self-analysis aided it may be by the guidance of a psychically minded doctor. On account of the paramount importance of the neuroses in our complex civilization I shall devote a special section to them.

CHAPTER TWO

MEDICAL PROGRESS—EARLY STEPS

THE discoveries and advances of medicine since its beginnings are almost endless. No two persons will construct the same list. The one I have prepared, heterogeneous as it necessarily must be, represents the "peaks" in medical history, as I see them. The list, roughly chronologic, is as follows:

Opium
Mercury
Cinchona—Peruvian Bark (Quinine)
The Revolution in Anatomy
The Circulation of the Blood
Citrus Fruits for Scurvy
Digitalis
Vaccination
Anesthesia
The Hypodermic Syringe
The Germ Causes of Disease—Bacteriology
Transmission of Disease by Insects
Antisepsis
Antitoxins
X-ray
Radium
Salvarsan—Chemotherapy
Blood Transfusion

Insulin
Liver Therapy
Allergy
Endocrinology
Psychoanalysis
Fever Treatment
Hormones
Vitamins
Viruses
Instruments of Precision

Opium. Every physician and every sufferer from agonizing pain, whether due to a transient or a lasting cause, will agree that opium is an incomparable blessing. We do not know who discovered that the juice of the poppy—*Papaver somniferum*—had the power to abolish pain and to produce sleep. Its virtues were known to the Egyptians and are mentioned in the Ebers Papyrus—1550 B.C. It is supposed to have been the chief ingredient of Nepenthe, the drink Helen of Troy gave to the guests of Menelaus to drive away their cares. Theophrastus, a contemporary of Aristotle, described it. The Arabians were well acquainted with the properties of the juice of the poppy and, it is believed, introduced the use of the drug into India and China. The Chinese are largely addicted to the smoking of opium—in Peiping one person in ten is said to have the habit. Paracelsus in the sixteenth century originated a secret preparation which he called laudanum and which is still in use, its technical name being tincture of opium.

Opium as used in medicine depends for its soothing properties upon the presence of a number of alkaloids —altogether twenty-one alkaloidal derivatives of opi-

um have been obtained, the best known being morphine and codeine.

While nothing compares with morphine or other derivatives of opium in relieving pain, there is danger of establishing the morphine habit in the person to whom it is too freely given. For those who suffer from a painful and hopeless disease, morphine not only makes life bearable, it actually prolongs it.

Morphine addiction is usually the result of the use of the drug for the relief of pain. Occasionally it arises in other ways. Thus, one of my patients, a confirmed addict, told me the following story. She was at a party at which will power was the subject of discussion. Someone remarked that even a strong will might break down under the repeated use of morphine. My patient insisted that such a thing could never happen to her—her will was unbreakable. She said she would prove it and began to use morphine, but it mastered her eventually. She recovered under treatment and abstained from the use of the drug for three years, then an unhappy love affair sent her back to the hypodermic syringe.

In the case of heroin, a secondary derivative of opium, the use arises less often from a desire to control pain than from imitation. Heroin addicts, who either snuff the drug or inject it hypodermically, have a great desire to proselytize, to make others use it. Heroin habituation is rarely cured. For that reason Congress a few years ago forbade the importation and manufacture of the drug. But so overpowering is the craving for it that addicts brave the greatest risks in their efforts to obtain it. Dope peddlers, as they are called, exist in all large cities despite the vigilance of the government.

Mercury was named after the god Mercury, probably on account of its elusive properties when handled. In

alchemy it is represented by the same sign as Mercury. Dioscorides in the first century A.D. gave it its chemical name, hydrargyrum, fluid silver, hence quicksilver. Its use in medicine seems to have originated with the Arabs, the first real chemists, who employed it in the treatment of various skin diseases. Without knowing it, they and their successors in western Europe cured many cases of syphilis with it before that disease was distinguished from leprosy. The intentional use of mercury in syphilis began near the close of the fifteenth century when Berengario da Carpi, professor of surgery at Bologna, became renowned for his treatment of syphilitic disease. One of his patients was that charming rogue, Benvenuto Cellini, who expressed his "gratitude" by saying that if the men Berengario had treated were to return to Bologna they would murder him.

Mercury was used by inhalation and by inunction, nearly always to the point of producing poisoning, the chief symptoms of which were inflammation of the mouth and loosening of the teeth. The famous humanist Ulrich von Hutten has recorded the sufferings he experienced as the result of the excessive use of mercury.

Calomel and bichloride of mercury or corrosive sublimate are the best known preparations of mercury, but they are not used so much today in the treatment of syphilis; arsenic and bismuth preparations have largely taken their place. Bichloride of mercury is a valuable local antiseptic, while calomel is a popular laxative.

Cinchona bark from a tree found in Peru, hence its name Peruvian bark, was brought to Europe sometime after the discovery of America by the Jesuit Barnabé de Cobo. The name is derived from the Vice-reine of Peru, the wife of the Count del Cinchon. "Bark" soon became the universal remedy against fevers, especially after Louis XIV was cured with it, although it is a

specific only for malarial fever. The alkaloid quinine was isolated from the crude bark in 1820. In the whole realm of drugs, quinine is the most valuable specific that medicine possesses. It is not without interest that the value of the drug was known long before malaria had been separated from other fevers and more than three hundred years before the cause of the disease, the Plasmodium malariæ, was discovered by the French army surgeon, Alphonse Laveran.

The Revolution in Anatomy. Vesalius, the Columbus of Anatomy, marks an epoch in medical history, for from his great work called *De Fabrica Humani Corporis*, published in 1543, modern medicine may be dated just as modern astronomy begins with Copernicus' book, *De Revolutionibus Orbium Cœlestium*, published in the same year. Before Vesalius, works on anatomy harked back to Galen who lived in the first century after Christ, and to a work by Copho who taught anatomy in the University of Salerno, probably in the eleventh century. Galen's anatomy was based on dissection of monkeys and Copho's on that of pigs. So sacrosanct was the word of Galen that when doctors found human anatomy to vary from it, it was the human body and not Galen that was wrong. Vesalius at first knew only Galen's anatomy and in his earlier years was a devout Galenist. Soon, however, he became aware of Galen's mistakes. It must have caused a fearful wrench to his soul to appear in print as a corrector and opponent of the great Greek anatomist. Like every pioneer Vesalius was criticized and reviled. Something happened to him either because of these attacks or because of some other unknown circumstance. At any rate he ceased dissection and finally started on a pilgrimage to the Holy Land but died of a fever on the way.

Vesalius' *Fabrica*, which was illustrated by his Belgian countryman Jan Kalkar, is the glory of every library fortunate enough to possess an original copy. At the present time the New York Academy of Medicine under the leadership of Doctor Samuel W. Lambert is bringing out a beautiful replica of the great work.

The Circulation of the Blood. In 1628 William Harvey, an English physician, published in Frankfort, Germany, a little work in Latin called *De Motu Cordis*. This book of but seventy-six pages is one of the most important texts not only in the history of medicine, but also in the history of civilization. It contains the first correct account, proved by many simple yet convincing experiments, of the circulation of the blood and is looked upon as the starting point of modern medicine.

Harvey was born in Folkestone in Kent in 1578; he studied medicine at Padua, the favorite university of English scholars in Elizabethan times—Shakespeare refers to it with praise. Harvey's discovery of the circulation was so novel that he was looked upon by his London colleagues as a crack-brained revolutionist and lost much of his practice despite the fact that King Charles I was his patron. In 1928 the whole world celebrated the tercentenary of his immortal discovery.

Lemon Juice for Scurvy. The greatest obstacle to long sea voyages in sailing ships was scurvy, or scorbutus, which at times incapacitated as many as three-fourths of the sailors of a fleet. When Jacques Cartier reached the coast of what is now Maine, his sailors were nearly all ill with scurvy. The disease was cured by the Indians with a decoction of bark and leaves of the hemlock-spruce. James Lind, a Scotchman, found orange and lemon juice would prevent scurvy and through his influence Sir Gilbert Blane in 1795 enjoined the use of

lemon juice upon all ships of the English navy—and as if by magic scurvy disappeared from British ships.

The disease, which was common in jails and asylums for the insane, was gradually abolished in those institutions when citrus fruits and fresh vegetables were added to the diet and better hygiene was introduced. Scurvy today is a rare disease, although it occurs among infants fed wholly on condensed milk.

In the chapter on vitamins I shall point out that scurvy is due to a lack of vitamin C in the diet.

Digitalis or Foxglove has no equal as a remedy in certain forms of heart disease—hence its introduction into medicine constitutes an historic landmark. In the year of the Declaration of Independence, William Withering, a wise physician in Shropshire, England, learned from an old woman that foxglove was good for dropsy. He began to use it successfully in practice and in 1785 published his *Account of the Fox-glove*, which has become a rare medical classic. The drug digitalis, which is made from the leaves of the plant, contains a number of active principles, some of which act almost as well as the whole plant itself. Being a powerful remedy, it should not be used except on the advice of a physician. There are many substitutes for digitalis, but none is its equal.

Vaccination. In 1721 Lady Mary Wortley Montagu brought into England the Turkish practice of inoculation against the smallpox. It consisted in introducing a little material from a pustule of smallpox, taken from a patient suffering with the disease, into the skin of a healthy person. The result as a rule was the development in the inoculated individual of a mild type of smallpox—such an individual was thereafter permanently protected against the highly fatal natural disease. In the American colonies the practice met much opposition as an interference with the ways of Providence,

but through the courageous example of Zabdiel Boylston, who inoculated his son and two Negro slaves and later 244 persons, and through the support of Increase Mather, William Douglas, Benjamin Franklin, and others, the method was widely adopted—it was the preventive measure used in America during the War of the Revolution.

Valuable as inoculation was, it possessed certain dangers: the material coming from a human individual sometimes transferred other diseases as well as a mild form of smallpox; furthermore, in some instances the smallpox induced was very severe.[1]

Edward Jenner, born in Gloucestershire in 1749, was struck by hearing from a milkmaid that as she had had the cowpox she could not take the smallpox. This seemed to be common knowledge among dairy people. Jenner at once realized the significance of this popular observation and on May 14, 1796, a memorable date in history, he inoculated a country boy, James Phipps, with matter from the arm of a milkmaid, Sarah Nelms, who had contracted cowpox in milking. On July 1, Jenner, to test the effect, inoculated Phipps with smallpox virus—the boy proved to be immune. In several pamphlets he described his method of "vaccination" and in a few years it was in world-wide use. To Doctor Benjamin Waterhouse of Boston belongs the credit of introducing the Jennerian method in this country. Thomas Jefferson was one of its most ardent advocates.

The practice of taking the vaccine lymph from a person having the cowpox was soon abandoned in favor of that in which the lymph is taken from calves inoculated with cowpox virus. As the result of vaccina-

[1] Jonathan Edwards, famous preacher and President of Princeton College, was one of those who died as the result of inoculation.

tion, which is compulsory in most civilized countries, smallpox has almost disappeared. Mild outbreaks occur occasionally, but many physicians have never seen an example of either the mild or the severe disease. Misguided persons unacquainted with medical history are now advocating the abrogation of the compulsory vaccination laws. They have to some extent succeeded in England. But no one knows when a severe, old-fashioned case of the disease may appear, in which event all unvaccinated persons in the same community are in danger, for smallpox is one of the most contagious of all diseases.[2] Having myself seen the severe disease with its danger to life and the terrible disfigurement of the face in the unvaccinated or unsuccessfully vaccinated, I am unequivocally opposed to the rescinding of the law of compulsory vaccination.

[2] In *Dr. Therne*, Ryder Haggard has given a vivid portrait of such an epidemic.

CHAPTER THREE

MEDICAL PROGRESS IN THE NINETEENTH CENTURY

Anesthesia is one of the greatest blessings of suffering humanity. One wonders how it was possible to do some of the operations surgeons were accustomed to perform before the days of anesthesia: cutting open the bladder for stone, removing cataracts from the eye, amputating limbs, excising a huge ovarian cyst from the abdomen, as was done for the first time in 1809 by the intrepid Ephraim McDowell of Danville, Kentucky. Mandragora, opium, *cannabis Indica* or Indian hemp, were used in ancient times to stupify patients but even with such drugs the suffering must have been very great.

Anesthesia in which the patient was made unconscious came into practical use in 1846. The story has often been told. As in so many other inventions and discoveries it is not easy to decide where priority belongs. In 1842 Doctor Crawford W. Long of Jefferson, Jackson County, Georgia, having observed that injuries received during ether frolics were not painful concluded that ether might be used to abolish the pain of surgical operations. In the spring of 1842 he put his theory to the test and removed successfully two small tumors from the neck of one James Venable, who had

been made unconscious with inhalations of ether. Long, however, did not follow up his discovery or make it generally available. W. T. Morton of Hartford, Connecticut, had observed the extraction of teeth by Horace Wells under nitrous oxide. After Wells had attempted to induce anesthesia with this gas at the Harvard University Medical School and had failed—he afterwards committed suicide—Morton suggested the use of ether and on October 16, 1846, Doctor Warren performed the first operation in the history of medicine under ether anesthesia. Turning to the wonder-struck spectators who had gathered at the Massachusetts General Hospital he said, "Gentlemen, this is no humbug."

In 1847 Sir James Y. Simpson, of Edinburgh, introduced chloroform as an anesthetic in England. Since that date, now nearly a hundred years, great progress has been made in anesthesia. Chloroform, at one time extensively used in this country, has been almost abandoned, although employed to some extent in England. For general anesthesia ether is still the favorite. However, many operations are being done under nitrous oxide gas and with other volatile substances produced in the chemical laboratory. When general anesthesia is used the patient often receives a sedative in advance, which to a large extent takes away the tension and dread incident to going to the operating room and also lessens the amount of ether or other anesthetic required. As ether is unpleasant to inhale usually the anesthesia is begun with nitrous oxide gas and then is completed with ether.

Today the administration of ether, nitrous oxide gas or other inhalants is made nearly foolproof and in modern hospitals is usually in the hands of carefully trained nurses. Unless the doctor himself is a specialist in anesthesia I should much prefer the nurse to give

the anesthetic. Improvement in anesthesia as well as the wonderful progress made in surgical technique has greatly lessened the incidence of shock following operations.

General anesthesia is always much dreaded by patients because of the disagreeable after-effects, especially the nausea that so commonly follows ether anesthesia. For that and other reasons many operations are performed nowadays without making the patient unconscious. There are two such types of anesthesia, neither of them known when I began the study of medicine, local anesthesia and spinal anesthesia.

Local anesthesia was introduced by Carl Ludwig Schleich, an erratic German surgeon whose recent autobiography *Those Were Good Days* reveals the fact that he was almost driven off the platform when he read his first paper on local anesthesia before the German Surgical Congress. He had the good fortune to see his method triumph and to be universally adopted. At the present time some very big operations, such as removal of gall stones, of the gall bladder and of the appendix, are often done under local anesthesia.

Spinal anesthesia is produced by injecting into the spinal canal a minute amount of a cocaine derivative. It causes anesthesia of the lower half of the body and is a most satisfactory method in certain specific conditions. It could never have been introduced but for the discovery by a German physician that the spinal canal could be tapped in the lower part of the back without danger to the system. Many of the older surgeons were opposed to spinal anesthesia but at the present date more and more surgeons are using it in an ever increasing number of operations.

There are persons who want to be in oblivion during their operation and will ask for gas or ether when they

might have local or spinal anesthesia. I can understand that feeling and have never resisted it unless there was something in the patient's condition that made general anesthesia dangerous.

Antisepsis, together with anesthesia, has made possible the astounding triumphs of modern surgery. Before the introduction of antisepsis all operations, even the simplest, were attended by a high mortality from blood poisoning or septicemia, erysipelas, tetanus or lockjaw, and hospital gangrene. Semmelweis in Vienna had shown that the disease childbed fever was brought by students and doctors who delivered women directly after coming from the autopsy or dissecting room. Oliver Wendell Holmes in 1846, a year before Semmelweis, had made similar observations. Joseph Lister, an English Quaker, whose operative mortality after amputations, although he was one of the most painstaking of surgeons, was 45 per cent, began to speculate on the possible causes of such disastrous results. He knew that when wounds united "by first intention," that is, without pus formation, there was no blood poisoning. When he became aware of the recently published researches of Louis Pasteur on fermentation and putrefaction, he at once appreciated their significance and set out to prevent the development of microorganisms in wounds. Using carbolic acid, which had a short time before been employed as a disinfectant of sewage at Carlisle, he succeeded in preventing pus formation.

He also made many improvements in surgical dressings and eventually obtained, though not without much opposition, especially from his own countrymen, world-wide acclaim for the antiseptic method. He was raised to the peerage in 1897—the first medical man to be so honored. Lord Lister is one of the greatest figures in

the medical Pantheon. His methods have undergone great modification in the last thirty or forty years—today surgeons strive for asepsis, keeping germs away from the operative field—rather than trying to destroy them after they have gained access. That is the reason for sterilizers, gowns, caps, masks, and rubber gloves and for the change of clothing and the meticulous scrubbing of hands and arms by surgeons and nurses before operations.

Lister's methods were rapidly adopted in Germany, more rapidly than in Great Britain, which caused an English surgeon to say: "We English wash our hands after the operations, others wash them before." In America the surgeons were divided; at the University of Pennsylvania with two professors of surgery, one became an enthusiastic follower of Lister, the other clung to the old methods. One noted Philadelphia surgeon who had been through the Civil War, when someone tried to convince him that pus formation and gangrene were due to the growth of germs in the wounds, retorted, "I saw many wounds in soldiers filled with maggots. Did the maggots cause the wounds?" Fortunately, surgeons are all of one mind today regarding the value of asepsis.

The Germ Causes of Disease. Nothing has contributed as much to our understanding of diseases as the discovery of their causes. *Rerum cognoscere causas* is the essence of understanding the phenomena of nature. While physiology and pathology had introduced experimental science into medicine, it was not until the bacteriologic era that medicine became a real science —a branch of biology. Bacteriology made it possible to transmit disease from man to animals, from animal to animal, and made it also possible for medical science to follow morbid processes in ways unknown before.

The idea that "germs," using that word in its broadest sense, might be the causes of disease is old. Perhaps the first who had an adumbration of the truth was the Renaissance physician of Verona, Girolamo Fracastoro, the author of the most famous medical poem in the world, a poem on "Syphilis, Sive Morbus Gallicus." This venereal disease owes its present name to this poem, which was published in Venice in 1530. In a treatise *On Contagion* he hints at the modern theory of germ infection—*seminaria contagionum*—although he had no real conception of the living nature of germs. Antonj van Leeuwenhoek, the famous Delft microscopist, who had 247 microscopes—very simple ones—and 419 lenses, nearly all ground by himself, was the first to see and to picture bacteria. A number of writers in the seventeenth, eighteenth, and early nineteenth century speak of a *contagium vivum* or *animatum*, but only on theoretic grounds. The actual founders of the bacteriologic era were Louis Pasteur and Robert Koch. Pasteur by a public plebiscite pronounced the greatest Frenchman of all time—greater than Napoleon or Victor Hugo—was the son of a tanner. His life has been depicted by his son-in-law, Vallery-Radot, in one of the greatest biographies in literature. Pasteur started out as a chemist and very early made important discoveries in crystal structure. He solved the mystery of the cause of silkworm disease, which had nearly ruined the French silk industry. Through his studies on fermentation and putrefaction he gave the death blow to the theory of spontaneous generation. Those same researches led him to a study of bacteria and soon afterwards he made his epochal discoveries in the field of human and animal diseases.

Thus, although not a physician, he became one of the greatest figures in the history of medicine. What is

now called pasteurization, through which milk and other beverages and perishable foods are made safe, originated with him. He had demonstrated that wine could be kept from spoiling by microorganisms if it were heated to a temperature of 55° to 60°C., without any change in the taste or bouquet of the wine. Among the diseases studied by him the most important are anthrax and rabies and hydrophobia. For anthrax, a very fatal disease of sheep and cattle, he found a method of vaccination which has saved sheep and cattle raisers untold sums. Anthrax is at times transmissible to man by wool or bristles. I have seen it follow the use of a shaving brush, the bristles of which had not been properly sterilized.

Hydrophobia, a terrible human disease conveyed through the bite of dog or wolf having rabies, formerly counted its victims by the thousands. Through Pasteur's method of treatment the disease has become exceedingly rare.

Robert Koch, twenty-one years younger than Pasteur, contributed enormously to the science of bacteriology; in fact, no one has contributed more. He discovered methods of growing bacteria in pure culture on various so-called media; also methods of staining or coloring them with aniline dyes, making them easily discernible with the microscope. His greatest achievement was the isolation of the long-sought cause of consumption, the tubercle bacillus. Other discoveries are the bacterial causes of wound infection and blood poisoning; the germ of Asiatic cholera, and many facts in connection with malaria and typhoid fever. Perhaps nothing he did created as much excitement as his announcement at the Tenth International Medical Congress in Berlin in 1890 that he had discovered a cure for tuberculosis in a substance derived from the tubercle

bacillus and called by him tuberculin. Consumptive patients from all over the world rushed to Berlin to obtain the remedy, only to be disappointed. Many did not come back alive. Koch's reputation for a time was under a cloud, but his subsequent work very soon brought him back to his pristine place in the confidence of medical men. Tuberculin at present is an invaluable diagnostic agent. Late in life Koch amazed the world by marrying a young actress. He lost friends, was criticized harshly, and died an unhappy man at the age of sixty-seven.

Under the inspiration, direct as well as indirect, of Pasteur and Koch, men everywhere took up the search for bacteria causing disease, and the discoveries followed each other with breath-taking rapidity. A few had indeed been made before Koch became the acknowledged leader in the new field. The last quarter of the nineteenth century saw the discovery of the majority of disease-producing or pathogenic microorganisms: the diphtheria bacillus by Klebs and Löffler; the gonococcus, cause of gonorrhea, by Neisser; the leprosy bacillus by Hansen; the typhoid bacillus by Eberth; the streptococcus and staphylococcus—the cause of blood poisoning, of boils, and abscesses—by Pasteur; the pneumococcus by Pasteur, by Sternberg, surgeon-general of the United States Army, and by Fränkel; of erysipelas by Fehleisen; of tetanus or lockjaw by Nicolaier; of Malta fever—undulant fever—related to Bang's disease of cattle, by Bruce; of bubonic plague by Kitasato and Yersin; of the malarial organism—Plasmodium malariæ—by Laveran; of cerebrospinal meningitis by Weichselbaum; of the gas bacillus, the cause of gas gangrene, by Welch; the dysentery bacillus by Shiga and by Flexner; the bacillus of tularemia by McCoy and Chapin.

In the twentieth century the discoveries of the actual causes of disease have been few—the greatest is that of the spirochete of syphilis, *Treponema pallidum*, by Schaudinn in 1905. This discovery ranks with that of the tubercle bacillus; unfortunately, however, the spirochete of syphilis has so far never been obtained, as has the tubercle bacillus, in pure culture; it can only be grown in contact with animal tissue.

Soon after the discovery of the Treponema, August Wassermann developed his blood test for syphilis, now so well known to the laity. It is a rather complicated test which shows the presence in the blood of infected human beings of a substance not present, except very rarely, in persons not infected with syphilis. When it is positive, barring the exceptions to which I have alluded, it is accepted as evidence that the individual whose blood gave the test has been infected with syphilis. A negative Wassermann test however does not rule out syphilitic infection. The original test has been modified and simplified and as at present employed is almost a routine investigation in the study of every adult patient.

Another important discovery was that of Howard T. Ricketts who in 1909 detected very small bodies, smaller than most bacteria, in Rocky Mountain spotted fever and in typhus fever. Ricketts became infected with typhus, the disease he was investigating, and died of it. The same bodies, called in his honor Rickettsia, have been found in insects, the bite of which conveys the disease to man.

There are other microorganisms, such as the bacillus of influenza and the bacillus of whooping cough, about which there is considerable doubt; that is, their causative relationship to the respective diseases has not been unequivocably established. Indeed, influenza is now

considered to be due to a special virus. From the whooping-cough bacillus a vaccine has been prepared and placed on the market.

The Transmission of Diseases by Insects. In the earliest ages of human history epidemic diseases were attributed to the wrath of the gods; later to evil planetary conjunction or to the *Genius epidemicus*, of which the writers of the time could form no definite conception. A more rational idea was that of the inhalation of miasma, bad or vitiated air, an idea that gave rise to the word malaria, still in use although applied to a disease with which bad air has nothing to do.

With the advent of bacteriology, the transmission of infectious diseases was greatly clarified—the germs entered with the air, through wounds, with food or drink, or through direct human contact, as in the sexual relation. These methods served to explain many diseases, but not all. The belief that flies could carry disease is very ancient—it goes back to the Egyptians and to biblical times. In the modern era abundant proof has been brought of this fact, especially in connection with typhoid fever. The fly, however, acts only indirectly; it carries the infecting germs on its body and deposits them on food—it does not introduce the bacteria directly into the blood.

In 1893 Theobald Smith, with F. L. Kilborne, demonstrated that the disease of cattle known as Texas fever was due to a protozoan conveyed from infected to well cattle by the bite of a tick. This discovery by a very modest man was of monumental importance, for it led to the not unexpected demonstration by Manson and by Ross that malaria was transmitted by a mosquito. A few years later Walter Reed proved the same mode of transmission of yellow fever, by a different mosquito, however. Ricketts, as already mentioned,

soon afterwards showed that Rocky Mountain spotted fever and typhus fever are conveyed by the bite of a tick and a louse respectively. African sleeping sickness, a disease in no wise related to the sleeping sickness so well known in this country, is due to a parasite called Trypanosoma, which is transmitted to man by the bite of the tsetse fly, Glossina. The fly after biting an infected individual or animal becomes infective in from three to seven weeks and remains so for life. Unlike the mosquito, the glossina bites mainly in the day time.

Antitoxins. Antitoxins are antidotes to the poisons or toxins of bacteria. The first antitoxin was prepared by von Behring, originally an army surgeon, and by Roux, later the head of the Pasteur Institute in Paris. Von Behring, working with the Japanese Kitasato in Koch's Institute in Berlin, found that the blood serum of animals injected with diphtheria toxins possessed the power of neutralizing the toxin in other animals. Applying this to man, he injected the blood serum of horses, immunized by repeated injections of toxin, into diphtheria patients and brought about a cure. After the year 1895 the antitoxin injection became the accepted treatment of diphtheria with the result that the mortality from this terrible disease of childhood was extraordinarily reduced.

A further advance in the battle against diphtheria was made in 1910-1911 by Schick, who introduced a test for susceptibility to diphtheria. Those susceptible can be immunized permanently by the injection under the skin of a toxin-antitoxin mixture, or of toxin chemically treated. As the result of antitoxin, the Schick test, and the prophylactic immunization in childhood, diphtheria has almost disappeared, a triumph of medicine for which words are scarcely adequate.

Antitoxins have been developed for a variety of diseases such as tetanus, epidemic cerebrospinal meningitis, erysipelas, pneumonia, and others. In the case of the first, tetanus or lockjaw, the antitoxin is almost uniformly efficacious if given immediately after the reception of the wound through which tetanus germs may have entered; when once the disease has developed, enormous doses of antitoxin are required—not infrequently they fail to save life. In epidemic cerebrospinal meningitis, the results of antitoxin treatment are at times brilliant, but at other times the treatment fails.

Pneumonia is the latest disease to come under the control of antitoxins. Within the past year great improvement has been achieved in the preparation of antitoxic serums, based on the recognition of the fact that the cause of pneumonia, unlike the cause of diphtheria, is not a single organism, but is represented by a large number of different varieties—thirty-two at the last count—and that the antitoxin prepared with one is definitely effective only in the pneumonia caused by that organism and only feebly or not at all in the pneumonias due to other varieties. While the pneumonia antitoxin has given startling results in treatment, it has not been found of value in prevention, although that some modification of it may duplicate the experience in diphtheria is entirely possible.

In the case of typhoid fever, vaccines, which are killed cultures of typhoid bacilli, have done much to remove typhoid fever from the category of prevalent diseases. Antitoxins, however, are not efficacious in the treatment of this disease.

Persons who have recovered from a natural infection with a disease have in their blood antitoxins or antibodies against that disease. These substances are transmissible to other persons by injection. So far, measles is

the only disease in which such blood serum has been of definite value as a preventive. Since nearly all adults have had measles, the serum is easily obtainable.

Chemotherapy. In 1828 Wöhler succeeded in making urea, the principal excretory substance in urine, by the artificial synthesis of two inorganic compounds, without the intervention of any vital process. This was an epoch-making discovery, for it proved that there is no essential difference between the structural chemistry of life and that of inanimate nature. Organic chemistry had been active before Wöhler's time, but far greater strides were made afterwards. Not until the recent development of physics, especially since the discovery of radioactivity, has any science shown progress comparable to that of chemistry.

A tremendous impetus was given by the theory of the six-carbon-atom closed ring of benzene, developed by Kekulé in 1865, which formed the starting point for endless discoveries of medicines, dyes, and, unfortunately, of explosives. The organic chemist today can deal with his carbon compounds as a child can deal with his blocks—he can add, subtract or substitute. Thousands of drugs have thus been produced, many either useless or harmful are forgotten, many are in daily use by physicians, while new ones are constantly being added. The vast majority of these synthetic preparations are not capable of curing a specific infectious disease, but serve general purposes, as for the relief of pain, to overcome nervousness and insomnia, to act upon the bowels, to induce anesthesia.

The first to produce a truly specific agent and thereby to begin the modern era of chemotherapy, was Paul Ehrlich of Frankfort, who introduced salvarsan in 1910 as the remedy against syphilis. It was popularly known as "606," this designation arising from the fact that it

was the six hundred and sixth compound in the series of substances Ehrlich had prepared in his search for a chemical agent that would kill the spirochete of syphilis in the human body without injuring the patient. As salvarsan, which is a compound containing a large proportion of arsenic, had certain technical drawbacks, Ehrlich continued his efforts until in the nine hundred and fourteenth preparation, called neosalvarsan, he found what he wanted. These numbers are an index of Ehrlich's indefatigable industry. In his first enthusiasm, Ehrlich claimed that one injection of the drug would cure the syphilitic patient. This prediction has not been borne out; nevertheless, salvarsan, or arsphenamine, as the preparation is called in this country, is used everywhere in the treatment of syphilis, although it is usually not the only agent employed.

During the Great War, when the importation of the drug was stopped, an enormous demand for it arose. Three physicians in Philadelphia succeeded in producing it. Although it was sold at a low price, the sale brought them a large sum of money. By the ordinary standards of business, they were entitled to this great profit on their labors, but to have appropriated it to their own use would have been a violation of medical ethics. Therefore, instead of keeping it, they set it apart as a permanent fund for research. These three men are J. F. Schamberg, recently deceased, John A. Kolmer, and George W. Raiziss.

Many chemotherapeutic drugs have since been made in the laboratory, but none is the equal of arsphenamine. Germanin or Bayer 205 has been found of considerable use in African sleeping sickness. Of more value as a specific chemotherapeutic agent is the recently introduced sulphanilamide—originally known by the trade names of prontylin and prontosil. This

substance seems to have a remarkable effect in diseases due to certain streptococci and to the meningococcus; also in meningitis following mastoid inflammation, and in gonorrhea.

The search for specific remedies is going on for diseases at present classed as incurable—cancer, leukemia, Hodgkin's disease, and others. Inasmuch as the chemist can at will make compounds that produce cancer in lower animals and by adding or taking away an atom or two of carbon and hydrogen can deprive the substance of its carcinogenic or cancer-producing properties, we may live in hopes that at some time in the future he will find a substance that will do for cancer what "606" does for syphilis.

CHAPTER FOUR

MEDICAL PROGRESS IN THE TWENTIETH CENTURY

NEARLY everyone who reads the newspapers and magazines is familiar with the words allergy, allergic and allergist. The word allergy from which the others are derived is hardly more than thirty years old, having been coined by a famous Viennese pediatrist, Clement von Pirquet, to express a peculiar reaction of the body when a foreign substance is introduced into the skin. Such a reaction does not follow when the substance is taken by mouth into the stomach and intestines, but only when injected parenterally, that is, away from the intestines. Von Pirquet made his original experiments with tuberculin, an extract from tubercle bacilli. When he injected a minute amount of this substance under the skin of children, those who had tuberculosis anywhere in their bodies responded with a little reddish swelling at the site of the injection and with moderate fever; those free from tuberculosis did not have such a reaction—none at all, in fact. The former had been made sensitive to tuberculin by having tuberculosis; von Pirquet called this state of sensitiveness "allergy." Little did he realize that he had made one of the great discoveries in the

history of medicine. He did not live to see the full fruition of his work for he died by his own hand at the height of his career. I know of no discovery since that of the bacterial causes of disease that has had so great an influence upon our concepts of disease as allergy.

From time immemorial it has been known that foods and other substances harmless for the majority of mankind may be harmful to some individuals. This fact is well expressed in the proverb: "What's one man's food is another man's poison." Certain individuals cannot eat eggs without becoming ill; others sicken after shell fish; some have rashes when they eat strawberries. Many years ago I saw a little boy who became desperately ill whenever he ate a banana. A distinguished medical friend of mine was subject to attacks of severe intestinal cramps—he was well up in the forties without ever suspecting the cause. One day his wife said, "It seems to me you always have a sick spell after we have had chicken." From that time on he kept a book and recorded what he ate and what happened. Surely enough, he never had any indisposition except after he had eaten chicken; other fowl was harmless. When he eliminated chicken, the attacks ceased altogether.

Not only foods but also drugs may act peculiarly upon some persons. I had as a patient a doctor's mother, who on my first visit said to me, "Doctor, don't give me any quinine; it poisons me." Having heard similar statements before that were not verified, I took her ideas about quinine to be imaginary. Hence when on a subsequent visit I felt she ought to have some quinine, I prescribed a very small amount of it; it produced exactly the effect she had described at our first meeting. Being a doctor's mother, I thought she probably had read the word quinine in the prescription; therefore when I next had occasion to prescribe, I put

in a minute dose of a preparation containing quinine but having a noncommital name. When I paid my next visit she said, "Doctor, if I did not know that you had not given me quinine, I should be sure there was some in my medicine." I never after that prescribed for her quinine in any form. Such peculiar reactions to food and drugs were until recently attributed to idiosyncrasies, a fine-sounding word which really meant very little. Through the work of many investigators—Richet, von Pirquet, Schick, Theobald Smith, Flexner, Rosenau, Anderson—we have come to have a little insight into the cause and nature of these curious reactions which play a far greater rôle in medicine than the early scientists imagined. Persons who react abnormally to substances that have no influence upon the generality of mankind, possess a constitutional condition—as I have said, it is called allergy—with which as a rule they are born. One of the best illustrations of this innate sensitiveness is hay fever. Although it must have afflicted mankind since the remotest times, the history of hay fever goes back only to 1819, a little over a hundred years, when the disease was described by an English physician who was himself a sufferer from it, John Bostock. He called it summer catarrh. It is estimated that about two million persons in the United States have hay fever.

The true nature of hay fever, that it is due to pollens acting on a sensitive or allergic mucous membrane, was discovered in 1903 by W. P. Dunbar, an American working in Hamburg, Germany. The hay fever subject has an allergy or a sensitiveness to certain plant pollens that float in the air. When this pollen comes in contact with the nasal mucous membrane of a sensitive individual, it produces a swelling and a mucous discharge with sneezing, a sense of heat and fulness, and difficult

breathing through the nose that make the hay fever patient such a conspicuous and pathetic subject. The allergy that predisposes to hay fever is probably innate, that is, the individual is born with it, although it is not necessarily inherited from the parents. But even if the father or the mother does not suffer from hay fever, he or she often exhibits other forms of allergy, such as a tendency to asthma, hives or eczema. More and more diseases are found to be attributable to allergy; this is especially true of some diseases of the skin, of asthma, of certain digestive disturbances, of which my friend's case cited above is an example, of various types of headache, etc. More attention has up to the present been given to hay fever, for the allergic basis is more easily demonstrated in that affection. In the majority of cases the substance awakening the allergic state, the so-called allergin, is the pollen of plants, chiefly ragweed. The much-blamed golden rod is practically innocent. Ragweed pollen in the atmosphere is responsible for the autumnal type of hay fever which usually starts in the middle or latter part of August. The ragweed plant flourishes in nearly all the territory east of the Rocky Mountains, with the exception of the northern Great Lakes region, northern New England, and southern Florida. Many persons are subject to head colds or hay fever in the spring: they are sensitive to tree pollens—oak, elm, maple, sycamore. In June various types of grasses may cause hay fever symptoms in those allergic to such pollens. Hay fever is not contagious, despite its resemblance to the common cold.

Individuals allergic to pollens may react not with hay fever but with a more distressing malady, asthma. A wide variety of substances may provoke asthma in sensitive individuals, not only pollens, but foods, drugs, house dust, etc. It is usually possible to determine the

offending agent by the so-called skin tests. The allergist rubs into a scratch or injects a minute amount of an extract made from any one of many substances under suspicion—a definite welt or wheal at the site of injection is a sign of sensitiveness to the particular extract. Treatment consists in desensitizing the patient to the allergic substance by the injection of increasing doses. A hay fever patient whose hay fever is due to a particular pollen escapes the disease if he lives during his season in a climate where the plant whence the pollen is derived is not found. He may also find comfort in an air-conditioned, dust-free room, but unfortunately his trouble returns as soon as he leaves his hermetically sealed quarters.

Asthma is a manifestation of allergy that has been known for over two thousand years. Sir John Floyer, in 1698 was the first to assign as the true cause of asthma spasm of the bronchial tubes, which is responsible for the wheezing so characteristic of the disease. The next important step came in 1864 when Henry Hyde Salter published a work which contains most of the knowledge we now possess of the disease. He called attention to the fact that asthmatic attacks were caused by feathers, by feather pillows, by emanations from animals—horses, dogs, sheep, guinea pigs and even from deer that were grazing under the patient's window.

In addition to these various allergic conditions, which are probably coeval with the human race itself, there are others that were not known in former times. A good illustration is the following: An individual who receives an injection of antitoxin, whether against diphtheria, lockjaw, pneumonia or blood poisoning, may after a week or ten days be seized with an attack of hives and intolerable itching, fever, often with swell-

ing of joints and great prostration. These symptoms, which can be greatly relieved by an injection of adrenalin, last only a few days and leave the patient no worse for his unpleasant experience. The condition, which is known as serum sickness, arises in those who are allergic or sensitive to horse serum of which the bulk of the injected antitoxin is composed. Persons who have been much about horses or who have had a previous antitoxin injection are especially prone to have serum sickness. Serum sickness is always preceded by a few days during which nothing seems to happen. In some individuals, a single injection of antitoxin produces a permanent state of such extreme hypersensitiveness that a subsequent injection of antitoxin, even years after the first one, throws them almost immediately into an alarming condition of collapse. The French physiologist, Charles Richet, who in 1909 studied this peculiar phenomenon called it anaphylaxis. On account of the danger of a possible anaphylaxis, everyone who has had an antitoxin injection at some time in his life ought to inform the physician who is preparing to give him a dose of antitoxin, regardless of its purpose. Moreover, the conscientious physician will not inject antitoxin without first testing the individual for allergy by injecting a minute amount of the substance well diluted into the skin or dropping a little into the eye.

I said in the beginning that the discoveries in the field of allergy had greatly affected our concepts of disease. One of the most interesting changes has occurred in our attitude toward bacterial diseases. The belief is growing that the presence of disease-producing bacteria in the throat, the tonsils, the sinuses, may sensitize the body in such a way that serious disease arises when such bacteria later get into the blood.

There is, however, another possible consequence; the constant presence of harmful bacteria in the throat or tonsils instead of sensitizing the individual who harbors them—altogether without knowing it—may immunize him. They are themselves safe, but become disease carriers; they are capable of conveying the disease to others without having it themselves. The carrier state is assuming more and more importance as its occurrence is being recognized in more diseases. It plays a rôle in diphtheria, typhoid fever, meningitis, pneumonia, influenza, and infantile paralysis.

I have spoken of von Pirquet's test with tuberculin by means of which the existence of tuberculosis can be demonstrated in the body. This test is of great value, not only in human beings but also in cattle. Cattle easily acquire tuberculosis; the milk of cattle so diseased may convey tuberculosis to children drinking it. Therefore the state demands that all dairy cattle be tested with tuberculin—an allergic reaction, usually a rise of temperature, is considered proof positive of tuberculous infection. Such cattle, the law requires, must be killed.

Allergic tests are used also in the diagnosis of other diseases than tuberculosis, asthma, or hay fever, especially in the determination of the presence or absence of a predisposition to various infections, such as diphtheria and scarlet fever. If a predisposition is discovered, we are able, surely in diphtheria and hopefully in scarlet fever, to modify the tendency, the allergy, and render the child immune. The vistas that are being opened by the application of the principles of allergy are truly magnificent.

Hormones. The body is made up of many organs and parts, even more parts than there are in one of the huge modern printing presses. When these organs and parts

work in perfect harmony we call it health. They depend upon one another and have no selfish aims in their relation. When one organ needs more blood because it is active it gets it. When the stomach receives food it begins to secrete gastric juice by means of which the food is in part digested. When the partially digested food passes into the intestines other juices appear to carry the digestion still further. The kidneys and the intestinal tract eliminate waste, the lungs carbon dioxide and water.

All these activities work reciprocally and go on endlessly, the different organs responding to their own needs and according to their particular relationship to the needs of other organs and of the body as a whole. Delicate mechanisms maintain the blood, the most complex fluid in existence, in a state of balance always adjusted to the body's changing needs despite our varied food intake, and despite external influence of temperature, humidity, and changes in the composition of the atmosphere. The body temperature scarcely varies more than a fraction of a degree, remaining around 98° in the tropics and at the poles. Whatever food we eat, provided it is not in a poisonous state, the alkalinity of the blood remains virtually the same, never changing to acid and never varying from a certain hydrogen-ion level more than a minute fraction of a point. And yet the system makes acids—a strong acid, hydrochloric, in the stomach, and a weaker acid in the urine, and the weakest of all, carbonic acid in the lungs and tissues. It is by reason of its power to produce acid in certain regions and alkalies in others, that the system is able to maintain the delicate acid-base equilibrium which is one of the greatest marvels in biology.

One cannot contemplate the harmonious action of so many separate factors to produce what Walter Cannon has called homeostasis, without a feeling of profound awe.

For many ages the interaction of the parts of the body was supposed to be under the sole control of the nervous system, especially that part called the sympathetic nervous system, which sends branches to the organs of the body and especially to the blood vessels. Bayliss and Starling, two English physiologists, found a chemical substance in the mucous membrane of the intestine which, when injected, produced secretion of pancreatic juice. This new and entirely unsuspected substance, which seemed to act independently of the nervous system, Bayliss and Starling called secretin.

It had long been thought that the thyroid gland made a substance that had important stimulating properties in the animal economy. After many had vainly tried, Kendall of the Mayo Clinic succeeded in isolating this substance, which he called thyroxin.

To the chemical substances represented by secretin and by thyroxin Bayliss and Starling gave the name of hormones. Many hormones are now known, the majority being products of the so-called ductless glands—"glands" the laity say—or endocrine glands or glands of internal secretion.

The endocrine glands produce specific chemical compounds essential to the normal life of the whole body. In disease a gland may produce either too much or too little of these specific compounds. Whether it ever produces an abnormal compound is still an unsettled question. Endocrine glands are the thyroid, the parathyroids, certain elements in the pancreas—those that make insulin—the adrenals, the sex glands, the pituitary body and perhaps the thymus and the pineal

gland. Among all of these the pituitary is the most remarkable and most wonderful, for though weighing only 9 grains or 0.57 grams, it governs many of the most important functions of the body.

The pituitary body or hypophysis consists of two parts or lobes, the anterior and the posterior. Between the two is a small layer of cells sometimes called the intermediate lobe. It has been known for fifty years that the anterior lobe has something to do with body growth but no one had ever isolated a definite chemical substance or hormone from it. Within the last few years a totally unexpected change has come over our ideas regarding the function or functions of this part of the pituitary gland, for no less than seven different hormones have been discovered in it. One of these controls ovarian periodicity in the female and development of the testes and seminal vesicles in the male; menstruation and pregnancy seem also to be closely linked with this hormone, while milk secretion is under the control of another, known as prolactin.

Disease of the pituitary body produces widespread changes owing to its many properties. It seems that none of the other endocrine glands can function adequately if deprived of pituitary control.

The posterior lobe has also a number of functions. It raises blood pressure, stimulates contraction of the uterus, affects the activity of the kidneys and the gastrointestinal tract, besides having some other less clearly defined properties. The pituitary gland is thus the master gland of the body and is rightfully called, in Cushing's phrase, "the leader of the endocrine orchestra."

The more we learn about the pituitary gland in its relation to the other glands of the body, the clearer becomes the evidence for a purely naturalistic basis of life

at the human level.[1] As a corollary there is less and less need for calling on a supernatural or mysterious vital force to explain complex biological phenomena. The great Danish physicist, Niels Bohr, speaking from the known biological point of view, has said that as the analysis of the mechanism of living organisms would be perfected as far as that of atomic phenomena, one would scarcely expect to find any features differing from the properties of inorganic matter.[2]

An interesting feature recently discovered in connection with hormones is the synergism, the coaction of these substances. Thus, when a given hormone producing a certain effect joins with another hormone producing a similar effect, the result of their action is greater than the summation of their effects. In other words, they intensify or synergize each other.

In the thyroid gland only one hormone has so far been discovered. It is called thyroxin and has to do with oxidation in the body and appears to have an influence upon every living cell in the animal organism. When the thyroid is diseased as in goiter or when for some reason it is inactive or overactive, profound changes occur in the body. The patient may become too fat when the function of the gland is below normal, or he may lose flesh, become nervous, and suffer from incessant palpitation, when the gland secretes an excess of thyroxin. Disease of the gland in early life leads to cretinism, a condition characterized by dwarfism and by mental retardation. I once knew a cretin who at the age of thirty-eight was the size of a boy of four and sat at table in a high chair. Mentally he was a complete imbecile.

[1] Oscar Riddle, *The Scientific Monthly*, August 1938, p. 97.
[2] *Nature*, November 13, 1937, p. 837.

The pancreas differs from the other endocrine glands in that it has a duct or outlet, but strange to say the internal secretion, the pancreatic hormone, does not pass out with this duct into the intestines but is carried directly into the blood.

In 1921, Banting, in conjunction with Best, discovered the hormone of the pancreas, which is called insulin because it is made by localized groups or islands of cells differing from the other cells of the pancreas. Insulin controls the utilization of sugar in the body; a deficiency manifests itself as diabetes or the sugar disease. By the use of insulin, which must be injected since it is inactive when taken by mouth, diabetes can be kept under control to a degree never dreamt of before the year 1921.

The adrenals are a pair of small organs sitting like a cocked hat atop the kidneys. Thomas Addison, a famous English physician, in 1855 discovered that tuberculosis of the adrenal or suprarenal glands produced a remarkable disease now called Addison's disease. The patient's skin acquires a dark brownish-black color; in addition there is marked bodily weakness and a tendency to vomiting and diarrhœa. The disease often ends in a sudden dramatic death. While Addison connected the symptoms with the morbid state of the adrenals, he had no idea how that connection was brought about. We now know that the adrenal gland produces hormones, the absence of which leads to serious diseases of which Addison's is the most striking. Certain disturbances of the glands in women cause the development of masculine characteristics, including a beard, but not all the bearded women have disease of the adrenal glands; in some the pituitary gland is responsible.

A Japanese, Takamine, working in this country, succeeded in isolating from the interior part of the supra-

renal gland a hormone which he called adrenalin. This substance has a number of uses, the most striking being in the treatment of asthma. Because adrenalin raises the blood pressure, it is also employed as a stimulant in shock. Quite recently Swingle and Pfiffner of Princeton, and Hartman of Buffalo, New York, have isolated from the surface portion of the adrenal gland another hormone—not yet in a chemically pure state—which under the name of cortin has found encouraging use in the treatment of Addison's disease.

That the sex glands manufacture important chemical substances might have been inferred from the changes that take place in boys and girls at the period of puberty. In girls the breasts enlarge, a growth of hair appears in certain parts of the body, and the menses set in. In boys the onset of puberty shows itself by a growth of hair and by a change in the voice. Eunuchism following castration also could not be explained satisfactorily except on the basis of the deprivation of some chemical substance normally derived from the testes. Modern researches have thrown a flood of light upon these matters, and also upon pregnancy and the menopause or change of life. However, the sex glands are not alone concerned in these profound biological processes. The pituitary, as I have already stated, likewise plays an important rôle, and perhaps other endocrine glands.

The thymus gland, high up in the chest behind the upper part of the sternum or breast bone, is active in early life and apparently has something to do with growth. Rowntree has shown that its growth promoting action is transmissible by heredity, so that the offspring of rats treated with thymus extract mature much earlier than control animals. He has also made interesting observations on the pineal gland, the smallest of

the ductless glands, but these researches are not sufficiently advanced for a definite conclusion regarding the function of this tiny organ.

The liver, kidney and spleen are large compared with the ductless glands. They have many functions, but whether they make hormones is as yet undetermined.

Hormones have lately been found in plants—they are called auxins and apparently play a part in vegetable life comparable to that played by hormones in animal life.

Historically it is difficult, as in so many other discoveries, to determine who was the father of the idea of internal secretions or the function of the ductless glands. The first experimental proof of an internal secretion was brought in 1849 by A. A. Berthold of Göttingen, who showed that transplantation of a cock's testes to another part of the body prevented the atrophy of the comb, which otherwise follows castration. This observation was forgotten until 1910, when Steinach published his conclusion that sexual desire and the secondary sex characters are controlled by the internal secretions of the sex glands.

Viruses. When bacteriology was making one discovery after another in the realm of the infectious diseases, it was but natural that physicians in their enthusiasm should conclude that all infectious diseases were of bacterial origin. This belief was greatly strengthened by the discovery in virtually all of them of bacteria which their discoverers promptly claimed to be the specific cause of the particular diseases they had investigated. However, it was soon found that in a number of instances the alleged bacteria were not the cause of the disease, but were accidental contaminants. Then in 1892 Iwanowsky found that the causative

agent of mosaic disease of tobacco was capable of passing through earthenware filters impervious to ordinary bacteria. Six years later Beijerinck confirmed Iwanowsky's researches and observations and reached the important conclusion that the infective agent was not bacterial in nature but a "contagious living fluid." In the same year it was found that the infective agent of foot-and-mouth disease of cattle would pass through porcelain filters, and in 1901 a similar result was obtained with the agent causing yellow fever in man. Since then hundreds of viruses, as these filter passers are called, have been discovered in man, animals, and plants. Among those that are of interest to laymen may be mentioned psittacosis, a disease acquired from parrots and other tropical birds, smallpox, vaccinia, hydrophobia, herpes or fever blisters, influenza, perhaps the common cold, epidemic encephalitis or sleeping sickness, yellow fever, infantile paralysis, foot-and-mouth disease, dog distemper, hog cholera, certain tumors in fowls and other animals, as well as tobacco mosaic and similar diseases of plants. And to this list might be added bacteriophage, the invisible lysin or dissolving agent of bacteria.

There are then diseases, both plant and animal, that are not due to ordinary bacteria, for the clear porcelain filtrate of the infective material, in which no bacteria can be demonstrated either by the microscope or by culture, can produce the original disease. It would appear that Beijerinck was not far wrong when he used the words "contagious living fluid," although it is generally agreed that the infective substance or virus is particulate, but with rare exceptions so small that it

cannot be seen with the highest powers of the microscope.[3]

What are viruses? The answer is difficult. Viruses have certain qualities that set them apart from other disease agents.

1. They are with few exceptions too small to be seen with the microscope.
2. They pass through porcelain filters that hold back the known bacteria.
3. They only grow in symbiosis with living cells.
4. They cannot be cultivated like bacteria in lifeless media.
5. They are highly specific in their action in that a given virus occurs or causes disease only in certain hosts.
6. The virus diseases, as a rule, produce lasting immunity.

All these qualities would make it appear as if viruses were living things, and yet there are viruses such as that of foot-and-mouth disease of cattle which are only slightly larger than the hemoglobin molecule[4] and actually several times smaller than certain molecules. This dilemma has led some authors (Rivers, for example) to assume three possibilities: some viruses may be infinitely small living organisms, "the midgets of the microbial world"; others may be representative forms of life unfamiliar to us; while still others may be inanimate, transmissible incitants of disease.

[3] Human beings are subject to a greater variety of viruses than lower animals. Some viruses seem to exist in a sort of symbiosis without giving rise to any disease. E. V. Cowdry (*Scientific Monthly*, September 1937, p. 266) calls them inapparent viruses. Under certain conditions hardly as yet understood they may become active and produce disease.

[4] The hemoglobin molecule measures 6.7mμ; that of foot-and-mouth disease 8 to 12mμ, and the hemocyanin molecule 24-29mμ. An mμ equals one-thousandth of a micron; a micron, μ, is one-thousandth of a millimeter; hence 1mμ equals one-millionth of a millimeter. A millimeter is 1–25th inch.

In 1935 W. M. Stanley of the Rockefeller Institute at Princeton succeeded in crystallizing the virus of tobacco mosaic. By repeatedly recrystallizing he obtained in the form of needles a protein of high molecular weight which possessed all the properties of the tobacco mosaic virus. This protein is distinguished by two striking properties: it is highly infectious and has a molecular weight greater than that of any other known protein. An idea of the infectivity of the protein may be obtained from Stanley's statement that one cubic centimeter of a solution containing only one part of the protein in ten billion parts of a buffer solution was usually found infectious. The disease produced in tobacco plants by this as well as by more concentrated solutions was the typical tobacco mosaic disease and from such infected plants more virus protein of the same kind as that introduced could be isolated.

From other virus plant diseases specific pathogenic proteins differing from that of the tobacco mosaic have been obtained, which is a strong point in favor of Stanley's view that the crystalline proteins are the actual viruses.

This far-reaching, I might say stupendous, conclusion is not accepted by all workers in the virus field. Some find it difficult to conceive that a crystalline protein can possess the property to multiply and to mutate, properties hitherto considered characteristic of living things. However, as Stanley says, we should not be too strongly influenced by the conventional criteria of life. There may be a transition stage between life and non-life endowed with the characteristics of both living and non-living things. It is furthermore known through the work of Northrop that the enzyme proteins and the hormones possess unusual properties

that relate them to virus proteins. The next few years promise astounding revelations in this field.

Big fleas have little fleas
Upon their backs, to bite 'em,
And little fleas have lesser fleas,
And so ad infinitum.

Bacteriophage. Nearly every animate thing in nature has its parasites. But when we come to such minute forms of life as bacteria, it would seem very doubtful *a priori* whether they could be subject to this law of nature. However, a few years ago an Englishman named Twort and a French-Canadian named d'Herelle independently found that certain bacterial cultures if allowed to stand would be dissolved, the medium in which they had grown becoming entirely clear. There had evidently been something in the culture that had destroyed the bacteria and had dissolved their bodies. Moreover, the active substance or lysin could be transplanted to other cultures of the same bacteria with the same result. D'Herelle called this mysterious substance bacteriophage—bacteria eater—and was of the opinion that it was a living thing, growing parasitically upon the bacteria and destroying them. Bacteriophage resembles viruses in that it is invisible with the microscope and filterable through earthenware filters, and that it grows only in contact with specific living cells, the particular bacteria upon which it possesses power to act. While in actual size bacteriophages are highly variable, they are as a rule smaller than some of the known viruses. Tobacco mosaic virus is believed to have a diameter of 33$m\mu$, bacteriophages vary from 100 down to 8$m\mu$, the smallest so far discovered being only a fraction larger than the hemoglobin molecule.

It is by no means proved that bacteriophage is a living entity, a micromicroorganism; good authorities, such as Northrop, hold that it is unorganized and, related to enzymes or ferments, reproduces itself autocatalytically from a precursor present in normal bacterial cells. As in the case of viruses, we are here apparently in no man's land between life and non-life.

Vitamins. Thanks to the unselfishness of yeast and other vitamin manufacturers, the public is informed in some degree about vitamins and their uses, but as it is possible that these altruistic radio program purveyors do not give complete or entirely correct information, I shall discuss the subject of vitamins at some length.

Vitamins are chemical substances that are necessary, but only in very small amounts, a fraction of a grain, for daily growth and the continual renewing of the body and for continued health.[5] The body cannot make vitamins; it obtains them from plants directly, or indirectly from the tissues of animals that have eaten the vitamin containing plants. Up to the present the vitamins have been designated by the letters of the alphabet, but they are increasing so rapidly through researches of biochemistry that the Latin alphabet may soon be exhausted.

Vitamin A, discovered by McCollum, is needed for growth and for the continued integrity of the higher tissues, the brain, the eye, the skin, the mucous membranes. It is contained in cream, butter, green leaves, yellow squash, pumpkin, yellow corn, sweet potatoes, carrots, tomatoes, yolk of eggs, and in the fat, liver, and kidneys of cattle. There is a biologically significant connection between vitamin A and carotene, the yellow coloring matter of carrots and many other natural

[5] Some mineral substances are also necessary—iron, iodine, perhaps copper and manganese—but they are not called vitamins.

foodstuffs. Deficiency of vitamin A produces disturbances of vision, especially that called night blindness, that is, the inability to see in a feeble light; also diseases of the skin and of the nervous system. Stones in the kidney and a tendency to infections are also attributed to an inadequate supply of vitamin A.[6]

The Japanese navy annually used to suffer an incapacitation of from 23 per cent to 40 per cent of its effective force from a disease called *kakke* by the Japanese and elsewhere *beriberi*. In 1883 a disastrous outbreak of the disease occurred on the training ship *Riujo*. Takaki, the keen-minded surgeon-general of the Japanese navy, was convinced of the nutritional nature of the disease and as an experiment ordered a complete duplication of the cruise with the sole alteration of a change in ration. The comparative results were so striking that the change in ration was presently made compulsory for the entire navy with the result that the incidence of beriberi since 1885 has never risen to as high a figure as one-half of one per cent of the force. Takaki had no clear notion of the nature of the shortage in the diet he had successfully overcome. It was a Dutch medical officer in Java, Eijkman, who by experiments on chickens, feeding them polished rice, was the first to realize that a specific substance was lacking in the food of the chickens. The polished rice diet produced a peculiar paralysis of the chickens' legs, but when rice polishings were added or used as food, the birds recovered or remained well. Casimir Funk in 1911, work-

[6] An adult needs at least 3,000 vitamin A units daily in order to remain healthy. (A unit is the amount that will produce a certain definite effect in a laboratory animal that has been deprived of the particular vitamin.) He can obtain this from a variety of sources: An ounce of cheese contains 700 units; a pint of milk, 1,040; three tablespoonfuls of butter—one and one-half ounces—1,600; an ounce of liver, 3,000; an ounce of spinach, 3,000; an ounce of eggs, 1,000; and a teaspoonful of good cod-liver oil, 8,280 units.

ing in the Pasteur Institute and later in the Lister Institute, claimed the isolation of a specific substance to which he gave the name of vitamin. He worked largely with pigeons. When the birds were kept cooped up and fed for a month on polished rice or white bread they lost the power of muscular control, their movements becoming wholly incoordinated, a condition not unlike the so-called dry form of beriberi in man.

The substance, the absence of which leads to beriberi, eluded research workers for thirty years, then Jansen and Donath, in the same laboratory in Java where Eijkman had made his epochal investigations, isolated the pure vitamin. The synthetic production of this vitamin, known as vitamin B1, is one of the romances of chemistry. Robert R. Williams of the Bell Telephone laboratories in New York City became interested in the substance and worked for many years in order to determine its composition. In the initial step he used a 1300-gallon tank for extracting the rice polishings, for the final step, a test tube. The product was so small in amount, it could be dissolved in 0.5 c.c. of water. In due time Williams found that the vitamin consisted of two nuclei, one a sulfonic acid nucleus, the other a weak base. When fitted together the new substance had all the qualities of the natural vitamin. Williams' brilliant researches have made the synthetic production of the vitamin, called thiamine, an easy matter. Recent experimental work has shown that thiamine is necessary for carbohydrate metabolism in plant and animal; by that token it is one of the most important biological substances ever discovered.

While beriberi is not endemic in the United States, it occurs, nevertheless, and not infrequently. I have encountered it in persons who lived on a monotonous diet, deficient in B1. One of my patients was a man

who, because of indigestion, had limited his food to milk. Originally he took large amounts, but gradually he reduced the quantity as his stomach became less and less able to digest the milk. When I saw him his tissues were greatly swollen because of extensive dropsy. He was so weak he had not been able to leave his bed for months. His color was bad and his disposition worse. A careful analysis of his food habits led me to the conclusion that he was suffering from beriberi. I advised the proper treatment, which consisted of the transfusion of blood and the administration of foods containing vitamin B1. As he refused to take nourishment, he was fed through a nasal tube. After two or three days he said he would eat if the tube were removed. When that was done he ate like any healthy person. In a short time the dropsy disappeared and soon he was a well man.

Women who in an effort to reduce their weight subsist on an inadequate diet may also develop some of the symptoms of beriberi.

There are other B vitamins besides B1. So far, six or seven have been discovered. They are all water-soluble.

B2 is necessary to life, especially in subtropical and tropical countries where the sunlight is strong. Its absence from the body leads to pellagra, a malady that has been very fatal in the Southern states. Sprue, a disease likewise largely confined to the South, may also be dependent upon an insufficiency of vitamin B2. The composition of B2—its chemical name is nicotinic acid—has been determined and it can now be made in the laboratory. There is a possibility that B2 as found in nature is a mixture of at least three vitamins.

Vitamin C is the antiscurvy vitamin. Scurvy, formerly a decimating disease among sailors, was controlled, as already mentioned, by the use of lemon or

lime juice long before the existence of vitamins was suspected. The vitamin was recently isolated by Szent-Györgyi, a Nobel Prize winner, and called by him ascorbic acid. Ascorbic acid is contained in various ductless glands and must bear some relation to their function. It is not only a preventive of scurvy, but it also aids in the healing of wounds. It is found in nature in citrous fruits and in the green leaves of plants.

Vitamin D protects the growing child against rickets. Rickets is a disease that weakens the bones, retards growth, and leads to defective development of the teeth. A pro-vitamin called ergosterol is found in large amounts in the skin, where it picks up energy from sunlight and is converted into vitamin D. In nature the vitamin is found most abundantly in cod-liver and halibut-liver oil, which is interesting in view of the fact that mankind has used cod-liver oil for centuries in the prevention and treatment of rickets without knowing what its efficacy depended upon. It also occurs in egg-yolk, but most other fats and milk contain but little.

Vitamin E is the antisterility vitamin. It is contained in cod-liver oil, in lettuce, and in wheat-germ oil. In the absence of E the successful bearing of mammalian young is impossible. Its absence in the male leads to sterility.

Vitamin K plays a rôle in the coagulation of the blood. So far, it has been found only in birds but not in mammals.

Vitamin P, called the permeability vitamin, or citrin, is present in lemons, paprika, and in many other vegetable substances. No symptoms result from the absence of the pure P vitamin, but if this absence is combined with a deficiency of vitamin C, then the full blown picture of scurvy appears.

Blood Transfusion. Even in the remotest periods of human history the blood was looked upon as the life fluid, as the bearer of all the qualities of the individual, wherefore a very natural belief arose that these qualities, particularly health and youth, could be transferred with the blood from one person to another. Victors in battle drank the blood of the vanquished in order to acquire their strength and courage. Greek mythology tells of a transfusion. Medea who had learned the method from Egyptian priests used it to rejuvenate Pelias, the aged father of Jason. For this reason blood transfusion is called *cura Medeana.* Ovid refers to the Medean legend as follows:

> *Stringite gladios veteremque haurite cruorem,*
> *Ut repleam vacuas juvenili sanguine venas!*[7]

In another passage, perhaps from Celsus, we read:

Sanguinem quoque gladiatorum bibunt ut viventibus poculis comitiales morbi . . . et una ipsam animam ex osculo vulnerum sorbere putant.[8]

Harvey's discovery of the circulation of the blood stimulated experiments in transfusion. It seems the first one to make the suggestion of direct transfusion from animal to animal was the Reverend Potter, in 1638. The idea came to him while he was watching one of Harvey's demonstrations. It was put into practice by Christopher Wren, Robert Boyle, and most successfully by Richard Lower, who in 1667 succeeded in transfusing blood from a lamb into a youth twenty-two years of age. However, Denis in Paris preceded

[7] "Draw your knives and drain out my old blood,
That I may fill my empty veins with youthful blood."

[8] "Epileptics also drink the blood of gladiators, as though from living cups, and think that by the kissing [that is, mouthing] of the wounds they are drinking in the life itself along [with the blood]."

Lower by a few months with a successful transfusion. The reports of these experiments created a sensation in Europe. Queen Christina of Sweden heard of the method while ill in Rome about 1680. Writing of it to her friend and physician Bourdelot, she says that she had heard of the new treatment for anemia, namely the injection of healthy animal blood, usually sheep's blood, into the patient. "I think," she says, "the invention of injecting blood is all very fine, but I should not like to try it myself, for fear that I might turn into a sheep. If I were to experience a metamorphosis, I should prefer to become a female lion, so that no one could devour me; I am feeling quite well . . . but if I should need this cure, I have decided to be injected with the blood of a German, for the German animal is less like a human being than is any other animal I know. . . ."

While in a few instances the results of transfusion were successful, in the majority they resulted in serious consequences, usually in death, so that eventually the method fell into disuse. It was not until 1824 that the first transfusion of human blood was done by James Blundell in London. During the American Civil War three successful transfusions were given and in the Franco-Prussian War a total of thirty-seven. The treatment made little progress because of the unpleasant or even fatal results that occasionally ensued. For a long time no one knew why—it seemed a mysterious thing that blood from a normal human being produced bad effects in some instances and not in others.

Ehrlich and Morgenroth in 1900 were the first to demonstrate the presence in the blood of a substance that either agglutinated or dissolved the red corpuscles of other individuals. They also showed that the absence of this effect or its presence had nothing to do

with consanguinity. Soon afterwards Landsteiner discovered that the blood serum of human beings could be divided into three groups, A, B, C, according to its action on the blood of other individuals. This work has been expanded and other so-called agglutinins and agglutinogens have been discovered. Four main groups of human blood have been established and are called, I, II, III, IV by Moss or AB, A, B, O:

I = AB
II = A
III = B
IV = O

These four types seem to be constant, that is, individuals do not change their type, although errors in typing may make it appear occasionally as if they did. It would be well if every individual knew to what group his blood belonged as this might save much valuable time and even might save life.

Landsteiner and Levine by means of a complicated technique (injection into rabbits) found two other elements or factors in human blood which they called M and N. Many tests for M and N have shown that there are three classes of human beings—Class I possesses only the M factor, II only the N, III both M and N factors.

The inheritance of blood groups follows Mendelian laws. Particularly is this true of M and N but it also holds good for A, B, AB and O. For example M or N can only appear in a child if one or both of its parents belong to M or N. This fact has led to the use of blood typing in the determination of paternity. It often happens in medico-legal practice that a man is accused of being the father of an illegitimate child. Blood typing may serve to eliminate the accused as the putative

father, if his blood type is totally different from that of the child. If it is similar to that of the child he may or may not be the child's father.

It is interesting that the characteristics of a blood that indicate to which group the blood belongs are found in practically all cells and fluids of the body. It is a profoundly significant constant. Disease does not seem to influence the blood grouping.

Recent discoveries by Doctor Leo Loeb have shown that from a biochemical point of view every individual is different from every other individual. However, these differences, which extend to all the tissues of the body, are not such as to interfere with successful blood transfusion.

In transfusing it is of course necessary to determine that the donor is in good health, that he is not anemic, that he is free from malaria and syphilis. In my practice I do not like to use blood from individuals who are advanced in age or smoke or drink to excess.

There is no such thing as a universal donor. Type IV can be used in about 80 per cent of all transfusions and an individual of type I can be looked upon as a universal recipient.

Transfusion is today one of the commonest procedures in hospitals. It is used to restore blood after hemorrhage, in conditions of shock, in acute infectious diseases, in anemias of certain types whether due to a hemorrhage or to other causes, and sometimes before operation, and again after operation.

In order to be prepared for any emergency nearly all hospitals have lists of professional donors belonging to the different blood groups who can be called upon for blood to suit any given patient. The amount of blood taken at one time is usually not above a pint. The professional donors should not give blood oftener than

once in four or five weeks and at the most eight times altogether.

In every instance although the type of both donor and recipient has been determined, their bloods should be matched against each other. In France and in Russia blood taken from cadavers has been used successfully for transfusion. Lately the so-called blood banks have been established in hospitals in this country. Blood is taken from willing donors and kept in flasks in an icebox for use in an emergency. Source and type are indicated on a label. The blood which is citrated keeps good for about five weeks and is available at all times.[9] The method obviates the necessity of sending out for donors and testing them until one of suitable type is found, which in an emergency may involve a dangerous loss of time.

If a blood transfusion is unsuccessful it means usually that the bloods did not match completely and that either the blood cells of the donor were dissolved by the blood serum of the recipient, or that the blood cells of the recipient were clumped by the serum of the donor. As a rule these mishaps cause only a temporary setback and the loss of the blood that was injected. In rare instances death has ensued, usually in a very short time.

The question has often been asked, how long does the new blood stay in the body. It used to be thought that the blood cells lived thirty days but it has been found that they live much longer, perhaps as much as 120 days or more.

Instruments of Precision. Diagnosis is an important part of medical practice. While a doctor may treat a patient, often successfully, without a correct diagnosis, it stands to reason that a proper appreciation of the nature of the disease is of great help in determining the

[9] Recent studies seem to show that blood stored more than five days has disadvantages.

treatment and in foretelling the outcome. Originally, diagnosis of the few diseases known was made by sight and touch, supplemented by the history of the patient. Those methods served until the latter half of the eighteenth century. Then a Viennese physician named Auenbrugger, in 1761, pointed out that much could be learned by percussing the chest—by knocking with the finger or hand upon it and that the sounds thus obtained varied with the presence and the amount of air contained in the region percussed.

The method of percussion, as it is called, very slowly made its way in the medical profession, which is by nature conservative. It was not until Corvisart, physician of the great Napoleon, published a French translation of Auenbrugger's Latin text that the method became popular.

About a decade later, the great Breton physician Laennec, a pupil of Corvisart, invented the stethoscope —an altogether invaluable medical instrument. Diagnosis of diseases of the heart and lungs immediately made great strides.

Our medical ancestors of the eighteenth and early nineteenth century diagnosed fever by touch of the hand; the clinical thermometer, a very clumsy instrument in the beginning, did not come into general use until about 1868, although Sanctorius of Padua, who died in 1636, constructed a water thermometer. The mercury thermometer was invented by the German Fahrenheit. It is a curious circumstance that England and America use the Fahrenheit scale; Germany that of the Frenchman Réaumur, and France the rational Centigrade scale in clinical thermometry.

The microscope has made possible an examination of the blood, of the urinary sediment, and of many other materials.

A valuable instrument, much respected by the laity, is the blood-pressure apparatus. Blood-pressure studies were first made by an English clergyman, Stephen Hales, in 1731. Hales inserted a long glass tube into the carotid artery in the neck of a horse and observed the height to which the blood ascended. An apparatus for determining blood pressure in man without opening a vessel was designed by von Basch in 1881. Great improvements have since been made and standard figures have been obtained by thousands of determinations in healthy persons of all ages. The laity are more or less familiar with blood pressure and have an unreasonable dread of high blood pressure or hypertension. Some are even worried by low blood pressure. Abnormal blood pressure is a symptom and must be taken in conjunction with other symptoms for any reliable conclusion as to its significance. Physicians determine two figures, one representing the high point, called the systolic pressure, and one representing the low point, called the diastolic. In many instances the latter is more informative than the systolic pressure.

As an aid to diagnosis in medicine and surgery nothing exceeds in value the X-ray. When in 1895 Röntgen of Würzburg announced the discovery of a hitherto unknown ray, which he called X-ray, no one could foresee the development in a generation of this mysterious agent which was capable of penetrating flesh and wood and other substances totally impervious to ordinary light.

We now know that the X-rays have this strange power because they are vastly smaller than the rays of light.

I remember the first X-ray pictures shown in Philadelphia. The opinion was expressed that the ray might prove useful for detecting fractures of bones and that

the cost of a proper outfit would not exceed $50. Anyone who has been in the X-ray laboratory of a large modern hospital may have some idea of the vast cost of the equipment needed at the present day.

As a means of diagnosis the X-ray gives invaluable information as regards the lungs, the gastro-intestinal tract, the gall bladder, the kidneys, and the urinary bladder. It shows the condition of the sinuses and, *mirabile dictu*, it can penetrate the skull to reveal the presence of tumors and other gross abnormalities. As a means of discovering fractures of bones and following the course after the fractures are set, the X-ray stands unrivalled. Formerly it was always necessary to make pictures in order to learn the condition of the parts to be investigated; today, much of the same information can be obtained with the fluoroscope at a great saving of money.

But diagnosis is not its only use; the X-ray is a valuable therapeutic agent. As a means of treating disease its field is widening, and much greater results may be expected from the powerful apparatus now being constructed in California and in Massachusetts.

Medicine is but one branch of science that has benefited by Röntgen's discovery. Physics has been almost as great a gainer. By means of the X-ray, scientists have penetrated into the interior of crystals and into the hidden nature of the atom. The X-ray also finds many uses in the arts and in industry.

The Electrocardiograph. It has long been known that when a muscle contracts an electric current is generated; that this was true of the heart, which is a muscle, was demonstrated in 1878 by Sanderson and Page in Oxford. Other observers confirmed this but were not able to devise a satisfactory recording instrument. This was done in 1902 by Einthoven of Leyden, who made use

of a string galvanometer. The instrument, greatly improved, is the electrocardiograph which makes photographic records of the electric currents in the heart. To obtain these records electrodes are applied in various ways, principally to arm and leg or chest, the vibrations of the delicate quartz string illuminated by an electric light being photographed on long strips of sensitive paper. After fixing and drying, the photographs or electrocardiograms are "read" by the cardiologist as hieroglyphics are deciphered by the Egyptologist.

The electrocardiograph has thrown a flood of light on the normal action as well as on the irregularities of the heart beat, the arrythmias; also upon often functional and upon organic diseases of the heart muscle. Valuable as the instrument is, it cannot take the place of the experienced ear and the seasoned judgment of the skilled clinician.

I have said that the electrocardiograph has thrown light on the irregularities of the heart—skipped beats, irregular pulse, etc. It should be stated that even before the introduction of Einthoven's instrument a keen general practitioner in the little English town of Burnley, James Mackenzie, a Scotchman, had made valuable observations on the irregular pulse. Mackenzie late in life migrated to London and founded a school at which the majority of present-day heart specialists, either directly or indirectly, have obtained their training. Retiring from practice in 1918, he founded with a donation of £50,000 received in fees an Institute for Clinical Research at St. Andrews, Scotland, for the purpose of studying disease from its inception. His idea was that by following individuals from their first illness throughout life and until death, medicine might learn the real beginnings as well as the course of disease. As physicians see patients at present, every chronic disease that is

diagnosable is no longer in its early stages—those stages, with rare exceptions, escape detection. Mackenzie believed that if careful records were kept by competent physicians of the medical history of all patients throughout life, his purpose, that of detecting disease in its incipiency, might to some extent be realized.

Sir James Mackenzie died of angina pectoris, the disease of which he was one of the most profound students in medical history.

Instruments for looking into the interior of organs or body cavities are numerous; the ophthalmoscope and other apparatuses of the oculist; instruments for inspecting the ear, the throat, the sinuses, and the bladder. Delicate instruments have been devised for inspecting the bronchial tubes and the esophagus and for removing foreign bodies from these regions. A good deal of use is now being made of the gastroscope, an ingenious device by means of which the interior of the stomach can be inspected.

Basal metabolism, a study of the metabolism of man, that is, of his utilization of the food and oxygen taken in, goes back to the great French chemist, Lavoisier, who was guillotined during the French Revolution—one of the outstanding crimes of the Reign of Terror. While the Englishman, Joseph Priestley, had discovered oxygen, it was Lavoisier who discovered its significance in relation to metabolism. With improvement in apparatus more knowledge was gained concerning the metabolic processes of man and animals, but not until the closing years of the nineteenth century was an apparatus devised that could be used conveniently in clinical medicine. The progress since then has been extraordinary, largely through the work of American investigators, such as Atwater, Benedict, Lusk and Dubois. As a result, basal metabolism estimations are

today almost routine in every good hospital. Of special value is the test in disturbances of the thyroid gland. When this organ is overactive the basal metabolic rate is high; when underactive, it is low. That information is of great value in instituting treatment, whether surgical or medical.

The study of respiratory metabolism is not limited to human beings. Metabolism determinations have been made on all forms of living matter from the smallest insect to the elephant. Records are available of the basal metabolism of all laboratory animals, farm and dairy animals, birds and reptiles. Benedict's recent monograph on the metabolism of the elephant is a valuable contribution to this field.

The Hypodermic Syringe. The first to introduce drugs through a hypodermic needle was Francis Rynd of Dublin in 1845. He used the gravity method. It was a Frenchman, Charles Gabriel Pravaz, who in 1851 employed the syringe; hence, to this day the hypodermic syringe is called Pravaz syringe in Germany. Fordyce Barker in 1856 brought the method to America.

In our day the syringe is an altogether indispensable tool, both in medical practice and in biological research. Not only is it used to inject drugs; it is also employed for the withdrawal of blood in making the Wassermann test for syphilis, to obtain blood for transfusion, for chemical analysis, and for the culture of bacteria circulating in the blood. Other important uses are to draw off spinal fluid through a puncture in the lower back and to remove fluid from the cavities of the body for relief in distress or for diagnosis. For the administration of antitoxins and vaccines the hypodermic syringe is an essential instrument.

It is apparent from its variety of uses that the adjective hypodermic has too limited a meaning, for the

syringe and needle are often used not to inject something under the skin, but to enter directly into a blood vessel. For many purposes, as for blood transfusion, for administering saline and glucose solutions, etc., the original gravity method devised by Francis Rynd is used. By this method the fluid, whatever its nature, is introduced slowly and at a constant speed; furthermore, the procedure can be continued for hours if desired without much supervision or manipulation.

The spectroscope, for many years one of the most valuable instruments for the astronomer and the physicist, has recently entered the medical field and is now used extensively to determine the nature of vitamins and to ascertain whether a given vitamin preparation meets the desired standard of strength. It is also employed to study the chemical activity of cells, especially cancer cells.

CHAPTER FIVE

CANCER — THE RIDDLE OF MODERN MEDICINE

THERE is no disease in which the entire world is more interested at the present time than cancer. Death from malignant disease claims about 135,000 lives a year in the United States. Under present conditions of mortality out of initial groups of one hundred at birth, ten white men and thirteen white women will eventually die of some form of cancer. Comparative statistics indicate that cancer is increasing; it is now second among the causes of death, having displaced tuberculosis. However, I am not entirely sure that these statistics can be taken at their face value. While they show that more persons die of cancer than formerly, they do not necessarily imply that more persons have cancer.

In Philadelphia 3,115 persons died of cancer in 1936, a death rate of 156.2 per 100,000, as against 149.7 per 100,000 in 1935. This shows a definite increase which can hardly be attributed to better diagnosis or any other incidental factors. The highest death rate from cancer is that of Los Angeles, 157.7; in New York City it is 142.7; in Chicago and Detroit 127.5.

It is conceivable that the apparent increase is due in part to our greater ability in diagnosis. Three persons

dying today of cancer of the lung, of the stomach, of the intestines respectively, a score of years ago might have been labelled as dying of tuberculosis of the lung, of anemia, of intestinal obstruction. On the other hand we must remember that by reason of the curative effects of certain methods of treatment a considerable number of cases do not appear in the mortality statistics as cancer deaths.

If we may take the cancer experience of the Metropolitan Life Insurance Company among its industrial policy holders as a guide, then the disease is slightly on the decrease in the female sex, at least in the age period between thirty-five and fifty-four. Only after the age of sixty-five is a rising tendency manifested. Among white male persons there has been an increase of not quite a third above what the cancer mortality was a quarter of a century ago. Most of the increase may justly be attributed to the fact that more cancer cases are recognized and reported, to more adequate training of physicians in the recognition of malignant disease, to a greater tendency on the part of the people to go to hospitals, to more frequent surgical treatment, and to less prejudice against postmortem examinations. All of these factors have contributed to bring more cancer cases to light, but when allowance is made for them, there still remain enough cases to warrant the belief that cancer is definitely on the increase. Many physicians are convinced that this is particularly true of cancer of the lung.

Statistics show that treatment is most successful in cancer of the breast, cervix, lip, mouth, skin and lower intestinal tract and less successful in cancer of the stomach, which is the most common type of cancer.

So far I have not defined the meaning of cancer. Cancers are tumors, but not all tumors are cancers.

Many tumors or growths are entirely harmless even when of fairly large size, while a cancer as small as a walnut if not removed will eventually kill, usually by causing cancers to grow elsewhere. Cancer, or carcinoma as it is technically called, is a malignant tumor because unless checked by treatment it always causes death. There is another tumor called sarcoma, which has a structure differing from that of cancer but as far as its baneful effects are concerned, it may be classed with the cancerous tumors for it also kills if not eradicated in time.

What causes cancer to grow? If I could answer that, I should be able to answer one of the greatest riddles in the realm of human and animal biology. We do not know the answer, but there are certain facts that are of interest in connection with this phase of our subject. The ovum from which the human being is derived—which represents its very beginning—is a microscopic object, a cell, measuring 150 to 250 microns (about 1–6 to 1–4 millimeter or 1–100 inch) in diameter. In the course of nine months this ovum grows into the child—an increase in size and weight of an extent for which we have the almost meaningless expression "a billion-fold." From birth to full growth, the increase is incomparably less—only about twenty times that of the child. After the attainment of full growth, normal growth stops except for repair or replacement. It is then that new growths usually begin to appear—whether growth energy goes into certain specific cells or tissues or whether the check to cell growth no longer is potent, is at present a question. We know when we cut ourselves, as for example in shaving, that if there is no infection the gap is filled by new cells to the old level, rarely beyond, and further growth ceases. Why? What tells the tissues of the face how much new tissue

to make? It is a great biological puzzle. Where support or strength is necessary, as in bones, an excess of tissue will be laid down, the so-called callus.

A cancer differs from the cells that serve for repair in that there is no automatic stop to its growth—the multiplication goes on and on, even when the patient becomes anemic, emaciated, exhausted and helpless. We have no definite knowledge to explain that irresistible growth which continues to the last flicker of life. All we definitely know is that in middle and advanced life such uncontrollable growths—malignant tumors—are most frequent.

A cancer cell is a derivative of a normal cell, but when once a cell has become cancerous, it never returns to normal cell life—unless destroyed or removed it will grow on resistlessly, relentlessly. It is, however, highly improbable that cancer starts from a single unruly cell, more probably it begins in larger cell structures—in ducts, glandular areas or surface epithelium.[1]

Some have maintained that cancer is a germ disease, but no germ has been found. The most interesting experimental results have shown that certain substances found in coal tar can produce cancer of the skin. And even more interesting is the recent discovery that the sex hormones which have to do with ovulation and pregnancy are chemically very similar to carcinogenic substances in coal tar. This is also true of certain acids found in human bile. These facts may have great significance, but what it is we do not as yet know.[2]

[1] By the methods developed by Ross Harrison and Alexis Carrel human cancer tissue has been kept alive and growing in glass dishes for over five years.

[2] Some recent experimental work on animals has suggested the possibility that the development of certain types of cancer is related to the presence or absence of an excess in the animal of the opposite sex hormone. Whether this has any bearing on the human species is at present unknown.

I have just said that no germ had been found in cancer that could be looked upon as the cause. Something, however, stimulates or activates cells to grow wildly—it may be a virus, which with our present instruments would be invisible. Such a virus which might be a highly complex protein could act as the stimulus to the multiplication of cells, just as a hormone from the pituitary gland acts as a stimulus to the growth of cells in the sex glands of the body.

Is cancer hereditary? Using the word hereditary in the correct sense, I would say cancer is not hereditary. A child whose mother or whose father has cancer is not born with cancer. Nevertheless, it is true that cancer runs in certain families, though in a most erratic way. In medical diagnosis this fact is important, for when a doctor is dealing with an obscure disease in an individual past middle life, the existence in the family, present or past, of a case of cancer increases greatly the probability that the patient in question has cancer; but it does no more than create a probability.

In animals, especially in mice, cancer can readily be made hereditary by the inbreeding of cancer strains, but when healthy animals free from the strain are bred together, cancer almost never appears. To some extent this knowledge is applicable to man; it is better for two persons in whose respective families cancer has occurred not to marry.

Cancer is *not* contagious, nor is any other malignant tumor.

How does a cancer begin? Usually as a slight irritation on a surface exposed to injury, such as the skin or mucous membrane, although it may start in the liver, kidney, pancreas or eye, organs that are little if at all exposed to injury—the origin of the cancer here is still an obscure problem. Functional overexcitation sug-

gests itself as a possible cause, or the congenital inclusion of cellular masses of abnormal type which in later life take on cancerous properties.

A single injury rarely if ever leads to cancer although many women with cancer of the breast remember a blow sometime in the past. It is most unlikely that that had anything to do with the development of the tumor. Moles of the skin, especially those of a black color, and scaly brownish patches about the face in elderly persons may become malignant, especially if they are picked, frequently cut in shaving, or otherwise irritated. The tumor developing in the black moles is probably the most vicious of all growths occurring in man, having as its dreaded equal only a tumor arising in the eye.

Patients have often asked whether we could tell the presence of a cancer by examining the blood. Unfortunately, the answer is in the negative; there is, despite assertions to the contrary, nothing in the blood that tells us definitely that a patient has a cancer. Blood studies under many conditions are of inestimable value, but they fail in cancer. The time may come, however, when we shall be able to tell.

The prevention of cancer is a subject that has made little headway. Two means are at our disposal, eugenic marriage—a doubtful method—and the avoidance of stimulation or irritation leading to transformation of normal into cancerous tissues. The latter is by far the more hopeful avenue.

What about the cure of cancer? There is only one cure known at present and that is complete removal of the growth in the earliest stages. Such removal cannot be accomplished by drugs or salves, by amulets, by prayer, or by denial of the existence of the cancer—only the knife or its two substitutes, the X-ray and radium,

can bring about a cure. They do not always succeed, even in early cancers, but the number of persons saved is steadily growing. Failure, especially in cancer of the breast, is commoner in persons under forty years than in those older.

I have already stated the fact that cancer spreads from the primary seat to other organs, organs often far removed. Seedlings in the form of cancer cells are carried in the blood or lymph stream and grow where they lodge. Often these secondary growths are vastly larger than their parent. Naturally, the longer a cancer is allowed to remain, the greater is the danger of such spread, hence the importance of the earliest possible removal.

It is proper that the public should be informed about the dangers of cancer so that delay in treatment may be avoided. On the other hand only the rarest mole becomes cancerous and the vast majority of nodules or growths are benign. One point should, however, be borne in mind—a discharge in middle life of blood from any surface—the genital tract, the bowel, the lung or with the urine—is someth ng that warrants immediate investigation by a physician. It may be a sign of cancer.

Great expectations have been aroused by the new discoveries in the domain of the atomic nucleus, notably neutron rays and artificial radioactivity. These in the opinion of Ernest O. Lawrence, the inventor of the enormously powerful cyclotron, give promise of having an important bearing upon problems of the biological and medical sciences. Hitherto physicians used radioactivity in the treatment of disease, especially cancer, but they had at their disposal only small quantities of radium. By means of the cyclotron it is possible to produce artificial radioactive substances in

amounts equivalent to several grams of radium. And when the neutron rays are once properly harnessed and their use understood it will be possible to obtain a yield from the cyclotron that is as great as would be obtained from a mixture of beryllium and several hundred kilograms of radium. When it is realized that in all the hospitals of the United States there are today only about 322 grams (one-third of a kilogram) of radium the possibilities of the new source developed in the Pacific Coast laboratories can be imagined.

For the present, the layman should distrust all statements of the discovery of a chemical or other cure for cancer that does not involve the surgical removal or the local destruction of the growth by radiation.

Unfortunately such discoveries appear frequently in the daily press, rousing false hopes and leading to dangerous if not fatal delays. Not long ago a number of cancer patients in Florida died of tetanus as the result of the injection of a highly questionable agent which happened to be contaminated with tetanus germs. To be sure, many persons suffering from hopeless cancer are willing to submit to any kind of treatment for which the proponents claim power to relieve or to cure. But—and this is the all-important point of medical propaganda—the time to treat cancer is before it has become hopeless. Unfortunately, despite the intensive campaign that has been waged in recent years, the results measured by the medical criterion of five-year cures, are very disappointing.

Thus statistics show that of a hundred cases of cancer of the stomach coming under medical observation, seventy-five are already inoperable when first seen and of the remaining twenty-five only a small number are in a sufficiently early stage that permits total removal of the growth. There are several reasons for these dis-

tressing results—delay on the part of the patient in seeking medical advice; difficulty of early diagnosis of some types of cancer of the stomach; and, thirdly, carelessness or ignorance of the doctor. Better education of the laity and of the profession and persistent research in the laboratory will, we may hope, lessen the numerical incidence of these antagonistic factors.

Wound Healing. When we cut ourselves in shaving or when the surgeon makes an incision, the wound in the absence of infection heals flush with the original surface. In some persons, particularly in the Negro, more tissue than is needed is produced, giving rise to an elevated scar, the so-called keloid.

The phenomenon of healing is so common that we do not think of the marvellous processes involved in it. Up to the time a wound is made the cells of the skin lie dormant. They give no evidence of the tremendous potential energy that is theirs, of their ability to fill up even huge gaps. Wound healing and regeneration of tissue are manifestations of the tendency to the preservation of life with which living tissues are endowed. In the lower animals in which cell differentiation is less marked than in the higher, whole organs may be regenerated—a limb or an eye—even if the primitive tissue, destined, for example, to make an eye, is transplanted to another part of the body. Carrel and Noüy from a study of the healing of wounds conclude that the speed of healing or cicatrization bears a relation to the physiologic age of the individual and is therefore a measure of senescence.

Cells in order to grow must find two conditions fulfilled—nutriment, including oxygen, must be available and waste products must be removed. What happens when these conditions are fulfilled is shown by a piece of the heart of a chick which Alexis Carrel began to

grow in 1912. In the twenty-six years that have elapsed this tissue has not shown the slightest sign of aging. If the chick from which the small particle of heart muscle was taken had lived a normal life it would have survived about ten years. Its heart tissue, however, is still living, just as it was in the beginning, and there is no reason except accident, why it should not live forever. If it were not necessary to cut the tissue every two days it would double every forty-eight hours. This is an index of the theoretical power of cell growth, if death could be avoided.

If the bit of tissue grows beyond a certain point, there being no blood vessels or circulatory system, the cells in the central region are not able to eliminate their waste products and these toxic substances bring about the death of other cells.

The culture of organs is the latest and perhaps the most thrilling discovery in the biological field. Encouraged by his success in cultivating tissues outside the body, Carrel, associating himself with Colonel Lindbergh, has proceeded to attempt culture of organs and anatomical regions. This was made possible by Lindbergh's invention of a perfusion pump, an apparatus permitting the pulsatile circulation through the excised organ of the nutritive fluid charged with the proper concentration of oxygen. Not only were the organs kept alive for days but they were kept functioning, so that the thyroid and the pancreas, for instance, set free their secretory products in the perfusing fluid. The possibilities envisaged by Carrel stagger the imagination—whole human organs might be kept alive, diseased organs might be placed in the Lindbergh pump as patients are placed in a hospital; they could then be treated far more energetically than within the body and if cured could be replanted in the patient.

Nutrient substances that will best stimulate hormone production might be prepared by modifying the perfusing fluids. When the proper media are obtained they can be used to stimulate inactive or diseased glands to secrete their hormones, a far better method than that of injecting such hormones. To bring about the regeneration within the pancreas of the islands of Langerhans would be a far more efficient method of treating diabetes than injecting insulin daily into the patient's body.

Doctor Carrel, it must be admitted, has an imagination that recognizes no boundaries. At present some things he foresees seem outside of the realm of the possible, but with the airplane, the radio, television, who would say that anything is impossible!

The Incurable Case. Stupendous as the progress of medicine has been there still remain a number of diseases that are beyond its power to cure or to prevent. One reason for this impuissance is that medicine is totally ignorant of the causes of these refractory diseases. I have already spoken at some length of cancer. While the knife or the X-ray or radium cures many cases of these diseases, in reality none of these methods is a cure in the strict sense. It is comparable to the cutting off of a leg for a hopeless fracture. Union of the broken bones and restoration of function—that is a cure. In that sense, then, cancer remains an incurable malady. To the same class belong a number of other diseases that flesh is heir to: Leukemia, Hodgkin's disease, multiple sclerosis, Parkinson's disease.

Leukemia is a disease of the blood in which the white cells, the leukocytes, become enormously increased. The fatal outcome can only be delayed, not averted.

Hodgkin's disease is a riotous destructive disease of the lymph glands, which sometimes responds temporarily to the X-ray, so that all large glands and other enlargements vanish like magic. The effect is illusory—the disease is not cured but comes back and kills.

Multiple sclerosis, a strange disease of the nervous system, particularly of the spinal cord, progresses slowly, gradually paralyzing the voluntary muscles and those of speech and swallowing. We have no way of arresting it, certainly none of restoring the destroyed functions.

The shaking palsy, Parkinson's disease or *paralysis agitans*, to a large degree belongs in the same class as multiple sclerosis, although it does not attack the same structures in brain and spinal cord. While much can be done for this disease to retard its progress and to make the patient comfortable the disease cannot be cured in the sense that the morbid nervous tissues can be made whole again.

There are other diseases that are generally considered incurable, as for example subacute bacterial endocarditis, an infectious disease of the heart valves, but as an occasional case recovers I shall not class it with the others mentioned.

When we realize that a hundred years ago tuberculosis was considered incurable, that less than a score of years ago diabetes in the young meant certain early death, and that only a dozen years ago diagnosis of pernicious anemia implied a span of life of hardly five years, then we may take hope. Who knows but that some young man now living will do for one of the incurable diseases what Banting did for diabetes and Minot for pernicious anemia?

Society's attitude toward incurable diseases has at times taken a strange turn. For instance, I know of a

very useful charitable institution which is called "Home for Incurables." In some cities there are hospitals denominated "Cancer Hospitals." The kind-hearted persons who inflict these names upon places for sufferers from incurable diseases do not realize the profoundly depressing effect of such designations. It is certainly unnecessary and cruel to impress upon the entering patient the hopelessness of his affliction. I know of several institutions that have adopted new names devoid of such an implication.

CHAPTER SIX

MEDICAL EDUCATION— EPITOME OF CIVILIZATION

The history of medical education is an interesting but little known subject. As much as any other history it is an epitome of the rise and sinuous progress of civilization.

Medicine rose out of the priesthood—for countless ages the shaman, or priest, and the healer were one. Like the sacerdotal ritual, the meager medical knowledge was handed down by word of mouth often in the same families. Eventually, first probably in Greece, the physician and the priest separated, although for a long time treatment of the ill continued to be carried on in temples. Science, mathematics and art look back to Greece for their primal sources, but medicine has a much better right to claim a Greek parenthood. While Semitic civilization concerned itself with ethical questions, with the relation of man to man and man to God, the Greek occupied itself with nature, with the physical world and man's relation to it. Both were necessary; they complemented each other.

The Greeks were the first to ask why and to formulate answers to that all-important question. Our respect for their mentality and for their achievements

becomes wellnigh boundless when we reflect that in the short space of two hundred years Greece, with an area of 25,000 square miles, about the size of the State of West Virginia, produced fourteen men of the first rank, fourteen men whose influence upon European civilization was of the greatest significance.[1] They have left us as their immortal legacy the spirit of scientific inquiry. Medicine for over two thousand years has acknowledged one of these fourteen, Hippocrates, as the Father of Medicine. In the time of Hippocrates, his precursors and followers, medicine freed itself from the priesthood, and through that separation man's attitude toward disease became changed. No longer was disease due to the wrath of God, to be appeased by the priest; it was due to natural causes—to climate, air, and waters, in the language of Hippocrates.

The Greeks were also the first to establish a medical school, that of Alexandria, where medicine was taught publicly to students from all the Mediterranean lands. Founded by Alexander of Macedonia and probably his greatest achievement, Alexandria became, after the break-up of its founder's far-flung empire, the greatest center of learning in the world. Under the enlightened Ptolemies it blossomed out in all respects into what might be called a university, with a magnificent library, unequalled elsewhere, of over six hundred thousand volumes. Ptolemy Soter, the greatest of the Ptolemies, called scholars from everywhere to Alexandria; in particular did he encourage the study of natural history, which included medicine.[2]

[1] "To one small people it was given to create the principle of progress. That people was the Greek. Except the blind forces of nature, nothing moves in this world which is not Greek in its origin."—Sir Henry Sumner Maine (from Theodor Gomperz, *Greek Thinkers*, New York, 1901, Vol. I).

[2] His son, Ptolemy Philadelphus, it will be remembered, had the Bible translated into Greek.

The school of Alexandria produced some of the greatest physicians of antiquity. Herophilus, the anatomist, gave his name to a part of the skull first described by him. He made numerous dissections and came very near to the discovery of the circulation of the blood. A younger contemporary, Erasistratus, also an anatomist, described the convolutions of the brain and the valves of the heart. Legend tells of a clever diagnosis Erasistratus made of the baffling sickness of Prince Antiochus. Erasistratus was feeling the patient's pulse when the latter's young mother-in-law, Stratonice, entered the room. When the pulse of the Prince suddenly bounded up, Erasistratus correctly diagnosed Antiochus' trouble as a hopeless passion for his mother-in-law.

The most famous physician produced by the school of Alexandria was Galen, a Greek from Pergamum in Asia Minor. Galen's works on anatomy, on medicine, and on treatment were the standard texts of medical students and of physicians for over fifteen hundred years. His influence dominated anatomic concepts until the middle of the sixteenth century and medical practice a century longer.

When the Romans conquered Egypt, they put an end to the school of Alexandria. They are also charged with having destroyed the library: that is the greatest indictment history brings against Julius Cæsar.

During the early Middle Ages medical teaching and practice was to a considerable extent in the hands of monks, especially those of the Benedictine Order. St. Benedict, the founder of the Order on Monte Cassino near Naples, had enjoined the care of the sick—*cura infirmorum*—upon the brethren. The world owes an additional debt to those enlightened monks, for they busied themselves with copying the ancient man-

uscripts which but for this pious work would probably have been entirely lost. Second in reputation as a cloister where medicine was practised is St. Gall in Switzerland, founded by the famous Irish missionary St. Columban. St. Gall had the first medicinal garden which dates back to the ninth century.

The Church, which for a time had tolerated the medical activities of monks, gradually came to look with disfavor upon such "extra-curricular" activity. First it forbade all surgical practice—on the basis of *ecclesia abhorret a sanguine*—a motto later more honored in the breach than the observance. Eventually all medical practice beyond the cloister walls was forbidden. This regulation had the effect of throwing medical practice more and more into lay, that is, non-monkish hands.

In the strict sense medical teaching in schools or universities was for centuries not done by laymen, for the doctors of medicine were generally clerics of a sort and wore the tonsure. But as they lived among the people, not in cloisters, and practised for pecuniary reward, they may be considered laymen when compared with itinerant monks.

About the ninth century there arose not far from Monte Cassino the medical university of Salerno, which enjoyed a fame rarely surpassed in later centuries. Little is known of its origin, but it has been definitely established that the professors were to a large extent laymen, in the sense of not being ecclesiastics. The school even had women professors, of whom Trotula, Dame Trot, is the most famous.

Salerno reached its zenith under the Norman rulers of the two Sicilies, especially under Robert and under Frederic II, one of the greatest figures of the Middle Ages. In the latter part of the thirteenth century it be-

gan to decline, losing its prestige to the newly-founded universities of Bologna, Naples, Montpellier, and Paris, whose early professors of medicine had been taught at Salerno. Salerno continued an inconspicuous existence until 1811, when it was finally closed by Napoleon.

Of the four universities mentioned above, Paris soon became the greatest; it is the mother, the real alma mater, of universities everywhere. Our academic customs, the academic gown and hood, the academic degrees hark back to the medieval university on the banks of the Seine.

At Paris, as well as at other universities founded about the same time or a little later, both the professors or masters, and the students were, as I have indicated, celibate clerics and had to submit to the tonsure. In 1452 Cardinal d'Estouteville abolished celibacy as being impious in a doctor, but only for the masters; the students were not allowed to marry.

Medical teaching was inconceivably pedantic, being largely confined to disputations on the ancient texts. The method is justly ridiculed by Molière in his play *Le Malade Imaginaire.* Surgery was sharply separated from medicine and was not taught in the university, but by an independent corporation, the Collège du St. Côme. This corporation was constantly at war with the barbers who wanted to perform some of the few surgical operations done in those days when there was no knowledge of anatomy, no anesthesia, no antisepsis. One curious grievance between the physicians and the surgeons arose from the fact that the former had any number of saints with St. Luke at the head, while the surgeons had only two, St. Cosmas and St. Damian.

I have said that there was no real knowledge of anatomy. That strange situation after thousands of

years of medicine finds its explanation in the fact that human dissection was not practised. The anatomy taught was that described by Galen from his dissection of monkeys and by Copho of Salerno, who dissected only pigs. It is generally held that the Church was responsible for this anomaly, for the lack of knowledge of human anatomy. The responsibility is usually placed on Pope Boniface VIII who in 1303 forbade dissection in a famous bull. That bull, however, permits of another explanation. During the Crusades it had become the custom to boil the bodies of knights who had fallen in battle in the Holy Land and to send their bones back for burial in consecrated ground. Many commentators claim that it was to prevent this strange, unsavory practice that Boniface issued his bull. Be that as it may, dissection was only furtively practised during the next hundred years, in some cities with the tacit approval of the ecclesiastical and lay authorities. Eventually dissections were done in public once or twice a year, but not by the professors, who thought it beneath their dignity to use the knife, but by deputies, while the professor lectured from a rostrum. The bodies were those of executed criminals. In Florence, it was ordered by law that no Florentine was to be dissected, but only criminals from other cities.

The Italian artists of the Renaissance were as active dissectors as the doctors. From the da Vinci drawings I saw on a visit to the library of Windsor Castle, I am inclined to believe that Leonardo did more dissecting than his medical contemporaries and that he had a clearer conception of what he saw than the doctors of his time.

With the development of large medical schools, especially in Great Britain and later in this country, the problem of obtaining bodies for dissection became

acute. As cadavers commanded a high price, it is perhaps not surprising, knowing the depravity of human nature, that men began to murder in order to obtain bodies to sell to the medical schools. The story of Burke and Hare and the so-called "sack-'em-up" men is one of the most lurid tales in criminal annals. In this country, while there is no record of similar crimes, graves were robbed for the purpose of supplying bodies until various state legislatures passed wise anatomic laws, those of Pennsylvania being among the best.

I might relate an anecdote in this connection: Doctor Benjamin Rush and Doctor Philip Syng Physic, one a leading physician and the other a leading surgeon in Philadelphia, were enemies. Rush predeceased Physic. A day or two after Rush's death while Physic was sitting in his drawing-room, there was a knock at the door. Physic opened it and found a burly Negro who said, "Do you want Doctor Rush's body? I can let you have him for $20." Physic slammed the door in the man's face and left a clause in his will that his grave should be watched for several months, long enough to make his body useless for anatomic purposes.

In America, medical education passed through the same phases as in Europe. The apprentice system prevailed in the colonies, but ambitious students would go to Europe for their final education. This was especially true of young men from Massachusetts, Pennsylvania, and South Carolina. The Mecca at first was Edinburgh, and to a less extent London and Leyden, in Holland. A group of Philadelphians who had studied in Edinburgh conceived the idea of establishing a medical school in the British colonies. Their dream became a reality when, in 1765, as the result of the efforts of John Morgan, the first medical school in this

country, that of the University of Pennsylvania, opened its doors.

For more than a century the medical course in the University of Pennsylvania and in its all too numerous daughters consisted of two short years of study, the second year's lectures usually identical with those of the first. About 1872 the course was lengthened to three years of five months each. But even then medical education lagged behind medical knowledge because the schools in many instances gave only a minimal amount of instruction. The professors of such important fundamental branches as anatomy, physiology, and chemistry, where these chairs existed, were often general practitioners or surgeons for whom teaching was merely an avocation. When I began the study of medicine the course was three years of seven months each. At that time the best medical schools required only a high school education, and a man could begin the practice of medicine or surgery or both the day after he received his doctor's diploma, without serving an internship or passing a state board examination. Every large city had several competing medical schools, the majority run primarily for the profit of the professors.

About 1894 or 1895 the change was made to a four years' course, and soon afterwards one year of college work was required for admission. Today two, three, and in some schools four years of college preparation are demanded of the matriculant. Moreover, when a young man is graduated in medicine at the end of four years, he is not yet permitted to practise but is, in the majority of states, required to serve a year's internship in a hospital, and then to pass an examination by the state board of medical licensure.

While the legal requirement of internship is only one year, few hospitals are content to accept men for so short a period, with the result that in the majority of urban hospitals the obligatory course is two years. Thus, the study of medicine occupies for many men a stretch of from nine to ten years—a far cry from the two years of but two generations ago and of three when I began.[3]

On another page I speak of the great number of medical schools with which in the latter years of the nineteenth and the first decade of the twentieth century this country was blessed or cursed. Many were so-called "diploma mills" where a man with a minimum amount of work and a variable sum of money could get a diploma giving him the privilege of practice. Through the famous revelations of Abraham Flexner and through the admirable work of the American Medical Association, the 431 medical schools which have been organized in this country have been reduced to about eighty which, I am happy to state, are nearly all first class, or Grade A schools. No longer need we bow our heads in shame in a comparison with medicine in Europe. The phenomenal progress begun before the Great War has continued. In consequence there is no longer the need or the tendency to go to Europe for study. When I was graduated and for many years afterwards anyone who could afford it went to Vienna or to German universities for advanced instruction. Today the current is rapidly being reversed—Europeans are coming to us for knowledge. For this remarkable change our medical schools are in part responsible, but only in part. A large share belongs to certain typically American institutions, such

[3] There are many ambitious young men who after their two years' internship serve from one to three years as residents or fellows in hospitals.

as the Rockefeller Institute for Medical Research, the Mayo Clinic, and similar centers of investigation.

Another important development in medical education has been the creation of Postgraduate Schools where men can concentrate on medical specialties. Originally these schools, like the early medical colleges, were largely private, but in the last decade they have come more and more to be responsibilities of the universities. Some of the best of these have not their equal in the world.

CHAPTER SEVEN

EVERYMAN AND HIS NEUROSIS

THERE is more unhappiness than happiness in the world today. It may always have been so but after ten thousand years of travail toward a rational civilization, it ought no longer to be so. Why has civilization failed? Can it succeed? What is the remedy? These are some of the questions we ask ourselves, if and when we snatch the time to sit down and think.

In early times and all through the Middle Ages, through the religious and dynastic wars, men suffered chiefly physically—plagues and pestilences, floods, war, starvation and serfdom were the enemies of happiness. Some of these enemies have been conquered, or if they persist, are found only in limited areas of the earth. Others still prevail everywhere. On the whole, however, the physical suffering due to a hostile environment is less than it was in former times but of mental suffering there appears to be an increase in intensity and in extent. In some degree this may be due to higher sensibilities on the part of human beings living in the twentieth century. This statement may be open to question, but taking mankind as a whole, increasing civilization must lead to higher grades of sensitiveness to environment.

In my practice as physician I have met a limited number of persons so well adjusted that they were happy or at least not unhappy, which, however, is not quite the same thing. Some of these happy people were secure in family and possessions and not ambitious. Others were idealistic, devoted to some cause that filled their lives completely, and some had found peace away from the world through a deeply religious feeling profound to the point of abnegation of self. Such well-adjusted individuals are rare in our present-day civilization. The majority of human beings are not well adjusted and experience at some time and in some degree a feeling of unhappiness, of depression, of apprehension, of fear, of self-depreciation. As long as these feelings are reasonably proportionate to the cause that generates them, they do not constitute a neurosis. It is only when they are disproportionate that they enter the neurotic class.

Most neuroses in otherwise normal persons have their roots in the experiences of childhood. Neurotic parents are bad for their children. Unfortunately such parents rarely know and rarely believe that they are neurotic. The basic evil is invariably a lack of genuine warmth and affection. A child can stand a great deal of what may be regarded as traumatism—such as sudden weaning, occasional beating, sex experiences—as long as inwardly he feels wanted and loved. Needless to say, a child feels keenly whether love is genuine, and cannot be fooled by any faked demonstrations. The main reason why a child does not receive enough warmth and affection lies in the parents' incapacity to give it on account of their own neuroses. More frequently than not, in my experience, the essential lack of warmth is camouflaged, and the parents claim to have in mind the child's best interest. Educational theories, over-

solicitude or the self-sacrificing attitude of an "ideal" mother are the basic factors contributing to an atmosphere that more than anything else lays the cornerstone for future feelings of insecurity.[1]

Fundamentally a neurosis is due to an insoluble anxiety-producing conflict, as for example, between two incompatible goals, such as a desire to achieve and to shine and a fear of being too conspicuous. This is well illustrated by a conflict in that mysterious person Lawrence of Arabia, who writes about himself in *The Seven Pillars of Wisdom*, as follows:

"*There was my craving to be liked—so strong and nervous that never could I open myself friendly to another. The terror of failure in an effort so important made me shrink from trying; besides, there was the standard; for intimacy seemed shameful unless the other could make the perfect reply, in the same language, after the same method, for the same reasons.*

"*There was a craving to be famous; and a horror of being known to like being known, contempt for passion for distinction made me refuse every offered honour. I cherished my independence almost as did a Bedouin, but my impotence of vision showed me my shape best in painted pictures, and the oblique overheard remarks of others best taught me my created impression. The eagerness to overhear and oversee myself was my assault upon my inviolate citadel.*"[2]

In a neurotic personality there is "a discrepancy between potentialities and accomplishments." Associated with this are usually indecision and a lack of self-confidence. To hide these unpleasant feelings from himself or to be compensated for them the neurotic individual builds up all manner of defenses and overcompensations.

[1] Horney, *The Neurotic Personality of Our Time*, New York, 1937.

[2] Quoted by the kind permission of Doubleday, Doran & Co. Inc., Garden City, New York.

As a rule the neurotic person is unaware of the conflicting tendencies within him or of their content and especially unaware of the fact that many phases of his conduct, of his reactions to his environment, are the result of over-compensation for the unresolved conflict. All thinking individuals are subject to conflicts. The difference between a normal and a neurotic person is that in the latter the conflicts are sharper and out of proportion to what constitutes a norm. As these shades of difference are not always sharply drawn it becomes difficult at times to distinguish between an anxiety that is justifiable and one that is not.

The average individual who has a pain in his chest will make little of it and will readily accept the doctor's assertion that it is due to indigestion or some other trivial cause. A person of less stable character will conclude that the pain is a symptom of heart disease, will not readily accept the doctor's assurance to the contrary, will brood over his ailment and will see death around the corner.

Another illustration: a man of middle life who is compelled to submit to a serious operation is entitled to a measure of objective anxiety. He has heard that persons have died from the operation he must undergo. If he reflects on the same possibility in his case he becomes worried and apprehensive, yet there is nothing abnormal in such an attitude. If, however, for some other reason and without the knowledge that someone died after the operation, and regardless of the many who recovered, he is sure he is going to die and no one can persuade him to the contrary, then his anxiety is no longer objective but is definitely neurotic.

I am not a psychiatric specialist but as a doctor who has seen all sorts and conditions of men I have observed certain powerful causes that have brought a latent

neurosis into the open. It must, however, be borne in mind that the basic factor in a neurosis is usually a sore spot created by some early happening, the scar of which persists and becomes irritated by any of a variety of provocative or, as I would call them, precipitating causes. Among such causes are the following:

Sex. The sex urge which becomes a conscious drive at puberty, increases in adolescence and may be overpowering at maturity, affects nearly all individuals and is cointensive with a desire for life. Faulty education in childhood, a survival of the hush philosophy of the Victorian era, puritanical repression, are the causes from which spring many of the anxieties of youth and later life. To them is often added another factor, namely sex trauma. Together they constitute a broad basis for many neuroses with which every experienced physician is familiar. Freud has emphasized the repression of instinctual drives as a potent cause of neuroses and of all instincts the one most apt to be repressed is the sex instinct.

The sexually conditioned neuroses are not limited to any age or to one sex; they affect the married as well as the unmarried. In the married sexual disharmony is a factor of prime importance in the production of neuroses, of latent or obvious unhappiness. The maladjustment may not appear in the consciousness of either partner but can be uncovered by the psychiatrically trained physician who when once he has brought it to light may remedy it by psychiatric and other measures.

In married women sterility, loss of physical charm from sickness, the early approach of the menopause with all it implies, often promote profound emotional disturbances and affect the most vital relationships of human lives. Many women are reluctant to speak of

such disappointments and apprehensions, the causes of which are often unappreciated by them, and it is only the physician interested in psychological problems who can resolve the difficulty.

Ambition. A second group of causes has to do with ambition—for wealth, for power, for recognition. Failure to achieve one's goal is a potent cause of neurotic anxiety and depression. The corollary is of course also true—a deep seated neurosis may paralyze the will. One of the unhappiest of mortals is the man who believes he is not appreciated, who sees others he considers his inferiors forge ahead of him. In our industrial era this is very common and accounts for much neurosis. The man may not deserve advancement but from his narcissistic angle he feels that he deserves it.

Domestic conflicts. In addition to those arising on the sexual level there are many others that make for unhappiness and for anxiety states. A frequent one is parental conflict in the bringing up of children. At bottom this is often conditioned on sexual disharmony but it also arises from differences in background, outlook and ambition. The conflict works harm on the children as well as on the parents and in the former lays the groundwork for later neuroses—for inferiority complexes and mother or father fixation with their consequences.

Occupation. The modern machine age with its monotonous employment is productive of an increasing amount of neuroses. It operates in a variety of ways, the monotony of the work being one of the most important. Long hours we hope will soon be a thing of the past but where they exist they not only work a hardship on the individual but also on the family, for the man or woman who brings home the dregs of a tired day is irritable, captious and generally neurotic.

The greatest anxiety factor in occupation, however, is insecurity. As Sir Arthur Newsholme expresses it, "One of the greatest evils in life is uncertainty of continuous ability to maintain self and family." This is the nightmare which haunts the minds of intelligent wage earners. Economic insecurity in our time is what serfdom was in the feudal period. It is a cause of mental distress and anxiety and it is therefore inimicable to health. It is a check on independent action, a straightjacket for the freedom of the individual. As a cause of mass neuroses it stands at the very top.

Another important cause of neurosis is a sense of guilt. This may be based on a real lapse from virtue—more often it rests on something mistakenly considered reprehensible. To the latter group of causes belong erotic dreams and certain sexual practices that are to a large extent physiologic, and not to be condemned as either sinful or harmful. Many a life has been blasted or emotionally stunted because of a false sense of guilt evoked through misinformation or through chastisement by parents for certain sexual acts that the modern educator and the physician recognize as entirely justifiable in certain circumstances.

Abnormal emotions such as unwarranted antipathy or actual hatred of those that should be loved and cherished are both an expression and a cause of neuroses. It is often difficult to say which is cause and which is effect. Only a careful study can reveal the hidden cause, but when that is accomplished by an understanding, psychiatrically trained, sympathetic physician, the neurosis is frequently banished. Alcoholism and drug addiction are often consequences of deep seated neuroses. The confirmed alcoholic finds in alcohol a release and an escape from an uncomfortable sense of inferiority. "Why shouldn't I, if I can

be King for a sixpence?" Occasionally overpowering grief or intense disappointment will drive a man to drink but the habit continues after the grief or disappointment is forgotten. Drug addiction is perhaps more often the result of inability to bear physical pain. At times it comes from imitation. There is involved in this whole problem a vicious circle—an existing neurosis may impel into the alcoholic or drug habit and such a habit in turn creates neuroses as well as psychoses, not to speak of organic changes. When once the true relation of the alcoholic or drug habit to the patient's psychic habitus is understood treatment will be more intelligently carried out than it is at present.

There is another important cause of neurosis in which the sex factor does not enter at all and that is the state of the world. A misguided patriotism expressing itself in an intolerant, aggressive nationalism, in ideologic prepossessions not founded on reason, eventually reacts also on those who cause the suffering, on the patriolaters, if I may coin a word. As a rule there is in such persons an unacknowledged sense of inferiority and their arrogance and intolerance are an overcompensation. The dilemma of the liberals living under such conditions is so great, the way out so dark, that a sensitive individual belonging to the liberal group cannot help becoming depressed, and in those neurotically inclined that depression intensifies the existing neurosis. Eventually such a distraught liberal develops a Hamletian complex; seeing that the world is out of joint and that he is powerless to set it right, he despairs of the future and falls into a pathological *Weltschmerz*.

Our neuroses take on many forms, according to background, culture, intelligence, and external circumstances. One of the most common is a general fear of impending disaster. Persons so affected are confirmed

pessimists who always expect the worst for themselves and others. I would call their state Cassandrism. They suffer also from indecision and physically are usually below par. The neurotic indecision cripples the power of action

> "*And enterprises of great pith and moment,*
> *With this regard their currents turn awry,*
> *And lose the name of action.*"

Other neurotic manifestations are fear of contagion, bacteriophobia, cancerophobia, phthisiophobia, cardiophobia, agarophobia (fear of open spaces), claustrophobia (fear of being alone); fear of high places, and fear of animals, dogs, cats, birds. A curious anxiety neurosis is fear of failure, expressing itself in stage fright and in the reckless courage of soldiers cowardly at heart, so well depicted in Crane's *Red Badge of Courage*. By will power the individual may conceal this fear, but it is there, a disturber of his peace of mind.

For the most difficult of the neurotic problems the practicing physician even if he has insight and some psychologic training must prove inadequate. Realizing this he would refer the patient to a physician specializing in mental troubles. On the other hand the specialist in psychiatry looking through the large end of his specialistic telescope may fail to see the organic disease that is often behind the neurotic manifestation. It is in large part from this double-sided failure on the one hand of the psychiatrist to see the organic disease and of the family physician's failure to appreciate that these seemingly organic symptoms have a neurosis as their basis that cults have sprung up and in many instances usurped the place of the doctor. These cults which minister without standards to the mind diseased, I shall discuss later.

When one remembers the influence psychoanalysis has had on literature, on medicine, on psychology, it can be compared with only two other fundamental concepts—evolution and relativity. Psychoanalysis is a method of dissecting the human personality—not with scissors and scalpel, but by a process of unraveling a web—like Penelope's, or by the method of Ariadne of following a thread toward an unknown terminus, without knowing at the beginning where the end is to be found. As in most discoveries, the thoughts underlying psychoanalysis germinated in several minds, as evolution did in Alfred Wallace as well as in Darwin. But it can be rightfully said that Sigmund Freud is the real originator from whom all subsequent psychoanalysists stem.

Psychoanalysis assumes in addition to the conscious mind the existence of a subconscious mind in which forgotten memories are stored—forgotten but not necessarily inactive. These subconscious memories may produce conscious reactions of whose subconscious origin the individual may or may not be aware. Psychoanalysis is able by the Freudian methods to bring that origin into consciousness. Thus a man may be overbearing because in his early youth he experienced slights and humiliations for which in adult life he unconsciously seeks compensation in ruthless aggressiveness. Recent writers have thus explained the dictator character of Mussolini. This is a rather simple example of the psychoanalytic approach. Many problems are more subtle and require great concentration and much patience.

Psychoanalysis, it is clear, reveals the mainsprings of our actions, of our peculiarities, of the motivation and meaning of which we are often entirely ignorant. The new tool penetrates the surface to the deeper layers of

the personality, as the X-ray enters the flesh to show the bones beneath.

One of the most significant developments of the Freudian theories is in the field of education. Here the emphasis is now on the personality and on emotional training, since it is realized that the pattern of the individual becomes set very early in life. In school as in the home the child should find security and a sense of achievement.

A word about psychoanalysis as a therapeutic agent. Its value as such is still questioned by many physicians. In part they expect too much. There are failures that are due to incompetence or to lack of real understanding of the principles of psychoanalysis on the part of the analysist. Inadequate analysis may be worse than none at all. The patient may find that such an analysis has robbed him of the old props without developing in him new ways of meeting the strains of life. Sometimes failure is due to lack of perseverance on the patient's part. Psychoanalysis takes a variable time, but generally it takes months or even years. The aim of most analyses is to give the patient a more mature and truer evaluation of his own personality, an objective which when achieved, sets free the powers that may have been held in check by a deep seated neurosis.

Since Charles Darwin no man has exercised a greater influence on human thought than Sigmund Freud. His penetrating studies of the human personality by the method of psychoanalysis have influenced medicine, literature, language in a way that can never be obliterated. It is quite probable that not all his conclusions regarding the subconscious, the influence of the libido, etc., will stand the test of time but medicine is bound to make use of many of his concepts in studying the neuroses and the psychoses, in fact the whole med-

ical approach to these disorders has been radically changed by Freud's doctrines. Through Freud and his followers language has been forever enriched by such significant words as subconscious, inferiority complex, mother fixation, superego, compulsion neurosis. Dream analysis since Freud has entered the field of psychology and is no longer, except in superstitious circles, the subject of fantastic or supernatural interpretation.

Plato in his *Republic* foreshadowed the psychoanalytic discussions of dreams and advocated the segregation and more common sense treatment of the insane. Among other things he says, "for this is the great error of our day in the treatment of the human body, that physicians separate the soul from the body."

CHAPTER EIGHT

SUPERSTITIONS AND CULTS

In medicine, as in religion, people from time immemorial have followed false gods. It is an ingrained tendency in our perverse human nature, and it is one for which man is, after all, not to be blamed, for from the point of view of individual liberty, of what in modern times we call democracy, it is his privilege. Totalitarianism may take away this and other privileges, but it cannot do so forever, hardly even for a thousand years.

In the very beginning of time there must have been both as regards religion and as regards medicine complete unanimity—what Herbert Spencer called the unanimity of the ignorant. That lasted countless aeons. Then came the age of the disagreement of the inquiring, in which we are now living. After many more aeons the world may see Spencer's unanimity of the wise—one need scarcely be a pessimist to doubt whether that dubious millennium will ever come.

I shall limit myself to the false gods that have appeared in the realm of medicine. There have been many.

No doubt there were irregular practitioners, untrained in the real art of medicine in the time of Hippocrates. The noble Hippocratic oath, by what it en-

joins, implies the existence of men who did not live up to the lofty precepts laid down by the Father of Medicine. This famous Oath which was composed either by Hippocrates or by one of his disciples, in ethical grandeur easily ranks with the Ten Commandments. In fact, the rewards and punishments promised in the Code are more rational than those of the Decalogue. The Oath translated by W. H. S. Jones, is as follows:

I swear by Apollo Physician, by Asclepius, by Health, by Heal-all, and by all the gods and goddesses, making them witnesses, that I will carry out, according to my ability and judgment, this oath and this indenture:

To regard my teacher in this art as equal to my parents; to make him partner in my livelihood, and when he is in need of money to share mine with him; to consider his offspring equal to my brothers; to teach them this art, if they require to learn it, without fee or indenture; and to impart precept, oral instruction, and all the other learning, to my sons, to the sons of my teacher, and to pupils who have signed the indenture and sworn obedience to the physician's Law, but to none other.

I will use treatment to help the sick according to my ability and judgment, but I will never use it to injure or wrong them.

I will not give poison to anyone though asked to do so, nor will I suggest such a plan. Similarly I will not give a pessary to a woman to cause abortion. But in purity and in holiness I will guard my life and my art.

I will not use the knife either on sufferers from stone, but I will give place to such as are craftsmen therein.

Into whatsoever house I enter, I will do so to help the sick, keeping myself free from all intentional wrong-doing and harm, especially from fornication with woman or man, bond or free.

Whatsoever in the course of practice I see or hear (or even outside my practice in social intercourse) that ought never to be

published abroad, I will not divulge, but consider such things to be holy secrets.

Now if I keep this oath and break it not, may I enjoy honor, in my life and art, among all men for all time; but if I transgress and forswear myself, may the opposite befall me.

The quack practitioners were active in Rome during the imperial epoch. As a rule they were Greeks; by their blatant claims which they could not make good, they brought the profession of medicine into disrepute. Probably at no time in history were the standards and the standing of the physician as low as in the period just preceding and just following the Augustan age. One can almost forgive Cato his contempt of doctors, seeing that the examples he had to judge by were so poor.

In the Middle Ages the itinerant vender of medicine was everywhere; without training, he played on the fears of the ignorant, rarely checked by legal restraints. He even performed minor operations, such as pulling teeth, bleeding and cupping, which the physician of that day thought beneath his dignity. To some extent there was an excuse for the medieval mountebank, for real doctors were scarce; few were educated in medical schools, of which only a small number existed. Medicine was handed down as a trade by the apprentice system and was, like the crafts, organized into a guild. In Florence, for example, the guild of doctors was sixth in rank, being placed between the silk workers and the skinners and furriers. It was united with the painters, writers, booksellers, and haberdashers. Eventually it rose to be second in dignity, coming directly after the judges and notaries, and just above the guild of barbers and money-changers or bankers. It had many great men in it, this composite guild. The poet Dante be-

longed until the Nazis of his day exiled him, the greatest of all Florentines.

Only a few of the important diseases had been clearly identified: smallpox and measles through the excellent description of the Arabic writer Rhazes; phthisis or consumption, hydrophobia, lockjaw, pneumonia—practically all known to Hippocrates—and such quasi-surgical conditions as stone in the bladder and hernia. Diagnosis was crude in keeping with the meager knowledge of anatomy and physiology. Much of it was based on inspection of the urine, a totally inadequate method of diagnosis. That practice explains why the medieval physician is so often depicted holding a flask of urine up to view. As long as diseases could be discovered by the method of uroscopy, as it was called, it was not necessary to see the patient. Such impossible diagnosis "by mail" did not die with the medieval doctor. I have seen a whole list of unrelated diseases diagnosed from a specimen of blood submitted to a doctor in San Francisco who became a multimillionaire through his now forgotten system.

Another element that favored quackery and charlatanism was the widely prevalent belief in astrology. In the Middle Ages when the earth was considered the center of the universe and man the center of the earth and sole reason for its existence, until Copernicus and Galileo put the earth where it belongs, it was not unnatural that man should entertain the belief that the stars concerned themselves with his fate. Sickness and health were bound up with the sun, moon and planets. The gathering of medicinal herbs, bleeding, cupping, and various other forms of treatment were guided by the phases of the moon and the signs of the zodiac, the twelve divisions of which corresponded to twelve divi-

sions of the human body. Chaucer's learned "Doctour of Physick" not only

> "*Knew the cause of everich maladye,*
> *And where engendred, and of what humour;*
> *He was a verrey parfit practisour,*"

but also

> "*Wel coude he fortunen the ascendent*
> *Of his images for his pacient.*"

This doctor represented the best medical training of his day. Astrology was not only considered useful in the diagnosis and treatment of disease, but as judicial astrology, it had the power of predicting the future and of guiding men's coming and going.

A good idea of the medieval attitude regarding the influence of the stars may be gotten from the writings of Roger Bacon, the most scientific mind of the Middle Ages. I quote freely from the Opus Major:[1]

"There are 1022 fixed stars, the size of which can be learned from astronomical instruments. These stars possess different forces in heat, cold moisture, dryness and all other qualities and natural changes. Among these stars are the principal ones of the twelve signs, by which all other things are especially subject to change. The signs are Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces, which are so named because the stars in the heavens have the quality of the things thus named. These signs Aries, Leo, and Sagittarius are in effect fiery; Taurus, Virgo, and Capricornus have reference to earth; Gemini, Libra, and Aquarius have reference to the air; Cancer, Scorpio, and Pisces are aquatic signs. Aries, Cancer, Libra, and Capricornus

[1] Robert Belle Burke, Philadelphia, 1938, Vol. 1.

are changeable signs, because in them are renewed the four principal complexions of all things, namely, warm and humid in Aries; warm and dry in Cancer; cold and dry in Libra; cold and humid in Capricornus.

"The first difference of planets is in their proper forces. For Saturn is cold and dry and the cause of all sloth and death and destruction of things through the egress of dryness and cold. Mars is destructive because of the egress of heat and dryness. These two planets never do good except by accident; just as a poison sometimes is an accidental good. These planets are called unfair, and unfortunate, and malevolent. Jupiter and Venus have heat and humidity; but Jupiter more so and better; and these planets are called fair in fortune and benevolent. Mercury is in a middle state between good and bad and is of a changeable nature. For with the good he is good and with the evil he is evil. The moon is cold and humid. The sun has generative and vital heat, because he is the cause of life and of generation in all things, whence although he is hot and dry, yet his heat does not cause corruption, but is generative, and his dryness is not death-dealing, and for this reason different from that in Mars. Saturn, when he has completed ten of his revolutions, causes a great change in the world. The complexions of all things are due to the heavens.

"All things are on man's account. For the head is of the quality of Aries; the neck of the quality of Taurus; the shoulders and arms of the quality of Gemini, and so on. Regarding this division authorities are in practical agreement, and an adequate reason dictates it as well as experience, which is more important. For if the moon is in Gemini, the sign corresponding to the arms and shoulders, it is dangerous to touch such members with iron, as in blood letting, scarifying or cupping,

and especially with knife or sword. And not only so, but this holds true of all surgical remedies; for they cause great difficulty and languor, and sometimes death; which they would not do, if the moon were in another sign. For Ptolemy says in the Centiloquium, 'If the moon is in a sign corresponding to a member, there is danger in touching the member with iron.'

"For a planet is dominant over every hour in particular, and half of a sign rises above the horizon every hour, from which the hours always vary, and the quarters of days likewise, and the days themselves, since as in every tongue the days are named from the planets, so have they diversity from them, as all learned men agree. This is by divine ordinance from the beginning of the world. There are hours of blood, of jaundice, of phlegm, and of melancholia.

"The forces of the heavens in various ways influence the different complexions of the healthy and the infirm. While the moon is crescent, all things increase; while it is waning, all things decrease or suffer diminution. As in the case of the seas, the brains of human beings, in marrow are augmented, and full when the moon is full and diminished with its waning. If anyone take a purgative when the moon is in conjunction with Jupiter, its action will be shortened and its effect lessened. If the moon should be in conjunction with Saturn, the one taking the potion will suffer gripings and be in danger owing to the evil influence of Saturn.

"Astronomy is needed by medicine, which uses selected remedies at selected times, when the moon is tempered by good and fortunate planets and by favorable signs of the Zodiac."

This lengthy quotation brings out another peculiar medical philosophy, namely the doctrine of the four humors—cold, moist, humid or warm, and dry. Every

disease as well as every remedy belonged to one of these four categories. That such a classification of diseases and of drugs must have been sterile needs scarcely to be emphasized.

A good deal has been written about Shakespeare's attitude towards astrology for he often refers to it, sometimes with approval, more frequently with contempt.

> "*The fault, dear Brutus, is not in our stars*
> *But in ourselves, that we are underlings.*"

The finest denunciation of astrology in the English language is, however, put in the mouth of Edmund in King Lear:

"*This is the excellent foppery of the world, that, when we are sick in fortune—often the surfeit of our own behavior—we make guilty of our disasters the sun, the moon, and the stars; as if we were villains by necessity; fools by heavenly compulsion; knaves, thieves, and treachers by spherical predominance; drunkards, liars, and adulterers, by an enforced obedience of planetary influence; and all that we are evil in, by a divine thrusting on: an admirable evasion of whoremaster man, to lay his goatish disposition to the charge of a star! My father compounded with my mother under the dragon's tail; and my nativity was under "ursa major"; so that it follows I am rough and lecherous.—Fut! I should have been that I am, had the maidenliest star in the firmament twinkled on my bastardizing.*"

As late as the middle of the eighteenth century one of the greatest physicians in England, Richard Mead, physician to Sir Isaac Newton, wrote a work on the influence of the sun and the moon on disease. But let us not lay too much unction to our souls; quite recently I have seen it stated that there is a relation between the stock market and sun spots. The English language still contains many reminders of the influence of astrol-

ogy—lunatic, disaster, lucky star, saturnine temperament, etc.[2]

The superstition that the touch of kings could cure disease is very old. It may have arisen at a time when the king was considered a demigod, not only a ruler by divine right but the actual representative of the deity. In the Middle Ages the king's touch was held to be most efficacious in the disease known as scrofula, the King's Evil, which was a tuberculous disease of the glands of the neck. The practice of the king's touch harks back in England to Edward the Confessor (1042-1066), and was continued down to the days of Queen Anne who died in 1714.

There is indubitable evidence that the king's touch was at times curative, a result explained somewhat as follows: The patient, who often came from a long distance, was required to wash and to put on clean clothes. The trip in the open air, the cleansing of the body and the general attention bestowed upon him could not help but improve his health and his morale. One of the kings who was conscious of his inadequacy to cure by touch is said to have remarked to a youth, "God give thee health and better sense."

Besides astrology another aberration of the human mind appeared that had just as much basis in fact as the supposed influence of the planets on disease; namely, witchcraft. Witches had the power either through the evil eye or by incantation or by magic to

[2] That telluric conditions apparently in no wise related to drugs may have an effect has been shown by D. I. Macht of Johns Hopkins University. He found that the activity of digitalis preparations is influenced by the barometric pressure, the same sample giving a different response at sea level, in the Rocky Mountains and in the Tyrolean Alps. It would, however, seem quite possible that the difference was due in part to an altered reactivity of the test animals.

influence people at a distance, producing disease and even death. The witch hunting mania, like the red hunting mania of today, was not confined to the ignorant. Pope Innocent VIII in 1489 issued a bull against witches that led to an intensive witch hunt during which almost two hundred "allies of Satan and the infernal fiends" were burned. The Bishop of Como in his zeal a few years later caused the burning of more than a thousand persons.[3]

Physicians of such great renown as William Harvey, the discoverer of the circulation of the blood, and Sir Thomas Browne, the famous author of *Religio Medici*, were firm believers in witches and their powers for evil. Martin Luther said in reference to witches, "I would burn all of them." During eighty years of the seventeenth century, about 40,000 persons were executed as witches.[4]

I might quote briefly from a letter of one of the agents of the great Augsburg banking house of Fugger who was virtually an eye witness in a case of witchcraft. Reporting from Vienna the third day of September, 1583, of the old calendar, he says: "The Jesuits here, two weeks ago, in company of the Bishop drove out a devil from a poor maid. Her mother is a witch and lies still in jail. First it was all of no avail, but finally she was given a drink of holy water. She had not long partaken of this before Satan left her."[5] As is well known, the witch hunting mania crossed the Atlantic Ocean to New England where witch burning continued well into the seventeenth century.

[3] From Eshleman, *Molders of Destiny*, New York, 1938, p. 164.

[4] Louis XIV, in 1674, abolished the crime of witchcraft, ordering that persons thus accused should be treated for madness.

[5] Quoted with the kind permission of the publishers, G. P. Putnam's Sons, New York.

Alchemy, a strange mixture of truth and error, also had a profound influence on medicine. While this influence was not always for good, alchemy must be looked upon as the mother of chemistry, and as such is entitled to a measure of respect. Among the errors and aberrations to which it gave rise was the belief in the mysterious properties of the metals, largely on an astrological basis. Gold was identified with the sun, and hence was looked upon as a sovereign remedy. A solution of gold in a boy's urine was called *aqua mirabilis*—wonder water—and was credited with curing many diseases, especially those of the eyes. The planet Saturn ruled lead, which explains why medical men even today speak of lead colic as saturnine colic and of a disease of the brain due to lead poisoning as saturnine encephalopathy.

Another strange notion that took a powerful hold on alchemists was the belief that by means of a magical liquid or through the so-called philosopher's stone base metals could be transmuted into gold. Search for this liquid and for the philosopher's stone, engaged alchemists for several hundred years. Men in our time have turned iron, copper, coal, oil, and printed paper into gold, but not by direct transmutation. Nevertheless, the modern physicist has verified in part the medieval alchemist's dream, for he has transmuted the elements. Lord Rutherford whose regrettable death occurred not long ago, in 1919 by means of alpha ray particles transformed nitrogen into oxygen. Moreover, we have seen nature, independent of man's influence, by its own alchemy transform radioactive substances into other elements—radium into lead—and within the last few years the Joliots (Madame Curie's daughter and son-in-law), the Italian physicist Fermi and others,

have succeeded in imitating nature, in making radioactive substances artificially.

Many alchemists were rank charlatans; others, apparently, were sincere and self-deceiving. We have some interesting first-hand accounts in the Fugger News Letters.[6] Writing from Venice under date of November 1, 1589, the Fugger agent reported on an alchemist Marco Antonio Bragadini, called Mamugnano, who on arriving in Venice literally threw gold about in shovelfuls. And this was his formula for making it: "One takes ten ounces of quicksilver and puts it into the fire and mixes it with a drop of liquid which he carries in an ampulla. Thus it promptly turns into good gold." One day in his absence the Secret Council of Ten tested the liquid, of which he had given them two vials, and succeeded in making six million ducats. Says the Agent, "It verily sounds like a fairy tale but Your Grace will surely believe us, for everything is so obvious that it cannot be doubted. One hears of nothing but of this excellent man who has no other wish but to serve his country." In a further letter about six weeks later it is stated that "the alchemist is said to be at work now making five thousand sequins a month at the request of our rulers. Thereafter he will make fifteen or sixteen millions more."

A few weeks later in another letter the Agent reports: "It is said of our Mamugnano that his craft for transforming quicksilver into gold does suffice for small quantities but fails to produce larger ones. Discussion is rife amongst some of this city's philosophers as to whether Mamugnano can renew the material wherewith he has made his gold, once it is used up. Some say yes, and others say no, so that it is doubtful what they

[6] Quoted with the kind permission of G. P. Putnam's Sons, New York.

really think about it." The Pope expressed himself as surprised that the rulers of Venice put so much faith in the man; although his art might be found to be successful, yet it only could accrue unto or by the help of Satan.

Has mankind changed very much? The people probably would not believe anyone who claimed to turn quicksilver into gold, but they will buy stocks, each dollar of which the seller assures them will turn into ten!

Alchemists concerned themselves also with search for the "quintessence," the elixir of life, which would bring eternal youth. However, only Faust succeeded, and he did so at the price of his soul.[7]

In their search for the philosopher's stone and the quintessence, alchemists stumbled on many important chemical substances—acids, alkalies, salts, etc.—which are now in universal use. Through these discoveries alchemy gradually became transformed into chemistry, a far more important transmutation than that of quicksilver into gold.

Since alchemy and astrology were cultivated most ardently by the Persians and the Arabs, especially the Arabs in Spain, many of the terms employed in the two pseudo-sciences have become embodied in the western languages, such as alkali, alcohol, elixir, etc.

[7] Ben Jonson in *The Alchemist* (London, 1894, p. 308), Act II, Scene I, makes Sir Epicure Mammon say:

> "I assure you,
> He that has once the flower of the sun,
> The perfect ruby, which we call elixir,
> Not only can do that, but by its virtue
> Can confer honor, love, respect, long life;
> Give safety, valor, yea, and victory,
> To whom he will. In eight and twenty days,
> I'll make an old man of fourscore, a child."

Long before the days of alchemy man harbored the belief that a single substance might be found that would cure all diseases. Such a potent substance was called a panacea or pharmakon. Man is still looking for panaceas, but he finds them not, neither in medicine nor in economics.

One of the most famous of the universal remedies was the bezoar, a concretion found in the stomach of cattle, goats, llamas, and other ruminants, and also in the stomach of the monkey and the porcupine. On account of its rarity, the bezoar was very costly, and hence was used only for princes and high dignitaries of the church. It was a universal antidote. A similar reputation attached to two complex mixtures, the famous Mithridate and the Theriacum of the Middle Ages. Different cities had their own brands of theriacum, the best known being that of Nuremberg. This was composed of seventy-two ingredients and required three months to prepare. When finished, the Senate of Nuremberg was wont to declare a public holiday, which was not unreasonable, since the theriac was supposed to cure all diseases.

A remedy that had an extensive vogue in the seventeenth century was the so-called Sympathetic Powder of Sir Kenelm Digby. Digby was a layman who claimed that the powder had been revealed to him by an eastern friar. It would cure injuries not only when directly applied to them, but also when applied to the blood-stained clothes of the injured man, even at a distance. A similar remedy was popular at an earlier day, the Sympathetic Ointment, which would heal wounds when applied to the weapon or to a splinter of wood that had been dipped into the wounded man's blood.

In the middle of the eighteenth century, the distinguished philosopher, Bishop Berkeley, like Digby a layman, proclaimed tar water as a universal remedy for the cure and prevention of disease. He was attacked and ridiculed for his rashness and tar water is forgotten.

I might in this connection quote once more from the Fugger News Letters. From Venice, the first day of September 1576. "Yesterday the Senate carried a resolution whereby it was decided to buy from the physician in the hospital the remedy against the present contagious plague, which he has repeatedly offered. He was there and then paid 30,000 ducats and as many gold zechines. He and his heirs are, moreover, to receive 300 ducats every month. Yesterday the secret was made public and as soon as I receive a copy of this I will send it to Your Serene Highness."

That medicine itself in fairly modern times was credulous and undiscriminating is shown by the drugs the doctors used. For example, the first London pharmacopeia, a guide book for the preparation and uses of medicines, published in 1618, contained 1,960 remedies, of which ninety-one were derived from the animal kingdom. Among these ninety-one were worms, dried vipers, foxes' lungs (for asthma), frogs, oil of ants, oil of wolves, etc. Other remedies were powders of precious stones, oil of bricks, butter made in May; but the height of absurdity was reached in the celebrated antidote of Mattioli, made up of about two hundred thirty ingredients, some of which were themselves compounded.

In pharmacopeias published later in the seventeenth century, some of the grotesque preparations are omitted, but the books still abound in strange remedies such as crabs' eyes, coral, black tops of crabs' claws, as well as the blood, fat, bile, viscera, bone marrow, teeth,

hoofs, horns, sexual organs, eggs, and excreta of animals of all sorts; bee-glue, cock's comb, cuttlefish, fur, feathers, human perspiration, human placenta, saliva of a fasting man, raw silk, spider webs, seashell, sponge, cast-off snake's skin, scorpions, parts of the skull of an executed criminal. Human urine was also a favorite remedy, being highly recommended by the learned Madame de Sevigné.

That the laity had faith in such disgusting remedies was bad enough, but that doctors incorporated them in their books and used them almost surpasses understanding. It shows that physicians then were not above the superstitions of their time—perhaps some writer three or four hundred years hence will say the same of the physicians of our day.

And yet how fortunate we are today. When we are seriously ill we do not have to swallow the nauseating and repulsive remedies which I have mentioned. I do not want to give the impression that all of them were irrational. Some of the animal substances used by the old physicians intuitively are employed with benefit today, such as liver in pernicious anemia, thyroid gland in goiter and obesity, and some others.

However, the public and the medical profession have too much faith in such preparations—it is for such faith promulgated largely by pharmaceutical houses that we shall be criticized by future generations.

The well-educated physician of today uses only a imited number of drugs and usually gives them in palatable form—in tablets, pills or capsules. Many he administers hypodermically or directly into the blood. If some old Rip Van Winkle were to come back nothing would so astonish him, leaving out of account the modern instruments of precision, including the X-ray,

as the simplicity of our methods of prescribing. This simplicity is due largely to chemistry and biology. The organic chemist can produce valuable drugs out of indifferent substances, as the builder creates a house out of bricks and mortar. So fast are new drugs and preparations put upon the market that it is almost impossible to keep up with them. Very rarely are they offered for sale without previous testing on the lower animals to see whether they are safe for human use. Had that been done in the case of elixir of sulphanilamide, more than eighty lives would not have been needlessly and tragically sacrificed.

Is mankind very different from what it was in the times I have spoken of? Has superstition died out? No, it exists today, not only among those whom we might call contemporary primitives, but also among people whom we know, who can read and write. It is powerful among the hex folk of Pennsylvania, the Pinies of New Jersey, the colored people of Harlem and the South. And it is not unknown on Park Avenue and in the classic shades of Nassau and other esoteric places. Even if men are, as we might say, "hard-boiled" when in health, in sickness the best of them will often become superstitious and credulous. They are prone to try anything that is suggested, especially because the distinction between recovery after a certain treatment from recovery because of a certain treatment requires a rare scientific attitude, which even many doctors lack. In politics, at least, post hoc propter hoc is king.

I am going to recite a few of the more recent superstitions and aberrations. Toward the close of the eighteenth century a man named Elisha Perkins of Norwich, Connecticut, claimed for a device called a metallic tractor power to cure a great variety of ills. This tractor which consisted of two metal rods, when

drawn over the skin drew out the disease. Elisha's son, Benjamin Douglas Perkins, went to London in 1795 and opened an office in the old house of John Hunter in Leicester Square. Supported enthusiastically by the Church and the aristocracy, he had a phenomenal success. No home, it was claimed, was complete without a set of Perkins' tractors; they sold, as Sir Humphry Rolleston tells us, like hot cakes at an inordinate price —they cost a shilling to make, and sold at five guineas. The bubble was pricked in 1800 by a famous doctor of Bath, John Haygarth, who showed that wooden imitations so painted as to resemble the metallic ones had worked even more miracles than those sold by Perkins. The tractors were soon forgotten, and today are museum pieces. Perkins retired to New York with more than £10,000, but died in his thirty-seventh year.

Mesmerism and mesmerize are reminders of another forgotten treatment, the invention of a skilful charlatan, Franz Anton Mesmer. Hypnotism, somewhat akin to mesmerism in its technique, was for a time held to be a wonderful remedy for nervous diseases. I myself have seen it achieve an occasional remarkable cure, but it fails often, is not applicable to many persons, and is much better replaced by suggestion.

Diseases of the eye have always been a fertile field for quackery. The ease with which spectacles could be sold and the profit they brought made the business very attractive. One of the most famous of quack oculists was Sir William Read, originally a tailor. He became "sworn oculist" to Queen Anne, who knighted him, and to her successor, George I. Although illiterate —the book on diseases of the eye of which he was the reputed author he could scarcely read—he succeeded by skilful advertising in acquiring a large practice which after his death was carried on by his wife. Read

was succeeded as "Court Oculist" to George I by a cobbler and Anabaptist preacher, Roger Grant. John Taylor, known as Chevalier Taylor and described by Samuel Johnson as the most ignorant man he ever knew, was one of the most impudent quacks on diseases of the eye in history. Although oculist to George II, he had time to travel from place to place, always preparing for his arrival by flamboyant advertisements. He himself became blind before his death.

One of the most notorious and infamous quacks in history was Joseph Balsamo, better known as Count Alexander Cagliostro. Born in Palermo in 1743 of an obscure family, he rose to be a man of tremendous influence. Although devoid of moral sense, without formal education, a forger and a thief, he became the idol of thousands who believed in him and came to him to be cured.

No less a person than the poet Goethe interested himself in the mountebank and on a visit to Palermo traced back the man's origin for several generations. Cagliostro first appeared as a miracle worker in Strassburg where he "cured" persons of high and low degree of the diseases the regular physicians had pronounced incurable. One of his favorite remedies was sugar of lead which he gave in large doses. While it may have done occasionally no harm, it produced lead poisoning, especially lead colic, in some of his patients. Cagliostro founded numerous lodges of a peculiar kind of Freemasonry in the places where he resided long enough.

Homeopathy is a theoretic system of medicine founded by Samuel Christian Friedrich Hahnemann toward the close of the eighteenth century, although its rise and spread belong to the nineteenth. Since Hahnemann's doctrine ignored altogether the causes of diseases and took account only of the symptoms, it was

originally a form of quackery. Symptoms, Hahnemann affirmed, could be cured by those very drugs which would produce these symptoms in healthy persons—*similia similibus curantur*—like cures like. He furthermore taught that seven-eighths of all chronic diseases were due to an infectious disorder, *psora*, or a suppressed itch, and could be cured by sulphur. A third doctrine advocated by Hahnemann was that the power, or potency, of drugs could be increased by dilution. As theories or hypotheses, all were wrong and irrational. Not being based on scientific experience, homeopathy in its original form added practically nothing to our knowledge of disease or to the science of medicine. Because of the meager training that the followers of homeopathy had in the early years of the system, the regular profession, allopaths as they were called, would have nothing to do with the cult. Under the influence of state boards of licensure, homeopathic schools began to improve their methods of teaching until today the courses given in the schools are very good. But homeopathy is fast disappearing as a separate system of medical practice. Today there are only two recognized schools of homeopathy in this country.

There are, however, two contributions that homeopathy has made to medicine. It has forced the regular profession to prescribe less nauseous medicines, and it has found a few vegetable drugs of value.

Some medical cults have a religious basis. They are evaluated with more difficulty because, as a rule, the idea of imposing upon the credulous for gain is absent. Many do great harm. Let me cite a case. A boy was greatly retarded in school; the teacher reprimanded and punished him, but without result. One day she asked the school doctor to test the boy's eyes. The lad was found to be so nearsighted he could not see the

blackboard. When the doctor prescribed glasses, the mother refused to have them made, for according to her faith, glasses were an invention of the devil.

A number of years ago, during a smallpox outbreak in Philadelphia, an unvaccinated child severely affected with the disease was brought to the Contagious Disease Hospital. The doctor, a friend of mine, wanted to vaccinate the parents and the other children in the family, but the parents absolutely refused—it was against their faith. My friend tried in every way to persuade them, even showed them that a vaccinated child could lie next to a smallpox child without getting the disease. It was of no avail—every member came down with the disease, several died.

The danger of the entrance of religious sects into the practice of medicine is twofold: First, while functional disease—mental depression, nervousness, etc.—may at times be relieved or abolished under the influence of religious teaching, organic diseases are only remotely influenced thereby and go on often, as I have personally seen, until all chance for cure is past; secondly, ignorance of the nature of the disease may cause others to be exposed to it and to acquire it.

Furthermore, no denial of the existence of disease, no matter how sincere and fervent, no matter how powerfully aided by present or absent treatment, can remove a gallstone blocking the common bile duct or a strangulated hernia or the malaria germ when once in the blood. Reason rebels against such doctrine.

Osteopathy originated in Kirkville, Missouri, about 1874, the brain child of one Andrew T. Still. Still, not a trained physician, believed and taught that the majority of diseases were due to maladjustments or displacements of the bony skeleton, especially of the vertebrae, of cartilages and ligaments, and could be cured

by manipulation. Like Hahnemann before him, he had very soon a large following. Osteopathic schools sprang up in all parts of the country and their graduates clamored for legal status in the states of the Union.

Where manipulation was applicable—in a limited number of painful conditions—the results of the method were very striking, and being a new and much publicized thing, many persons were attracted to it. In consequence, a number of states gave to osteopathy recognition as a drugless cult. Gradually, imperceptibly, as in the case of homeopathy, the teaching in the better osteopathic schools was improved, and as it improved, it wandered farther and farther away from the methods and doctrines of A. T. Still. In the catalogs of their best schools, the osteopaths do not even mention their formerly venerated founder.

Many a man will ask the question, "What is wrong with osteopathy?" Two years ago, an act was introduced in the House of Lords granting the osteopaths legal status as practitioners of medicine in England. The editor of the London *Lancet* asked me to write a letter indicating the position of osteopathy in this country. After considerable study of the history of the cult and of its present position and system of teaching, I wrote to the effect that as a method of treatment it was of limited applicability and that many states would not recognize it as on a par with medicine. There was no objection to osteopathy as such; all that the physicians contended for was that any man desiring to practise osteopathy—like the man who wanted to practise treatment of diseases of the eye, of the throat, or of the ear—should have the same fundamental training as any other specialist. I do not see how any reasonable human being can do otherwise than approve of this position, which protects the public and gives to the

osteopath the same fundamental education as is required of physicians. The House of Lords must have taken this view, for they rejected the bill.

Chiropractic is also a manipulative method which makes all the claims made by osteopathy. Conceived by D. D. Palmer about 1894, it is an excrescence on the osteopathic body, as osteopathy was upon regular medicine, but it is cruder, more violent, and is practised for the most part by men without education. It attributes all diseases to pressure on the spinal nerves by dislocation of the vertebrae. Treatment consists in removing this pressure. As in the case of new cults in all ages, men and women who are dissatisfied, impatient, uninformed, go to chiropractors and if they are perchance helped, they feel a certain moral exaltation in espousing the cause of a supposed underdog. For that reason and also through the mysterious workings of politicians, chiropractic is making a strong fight for legal status, which so far has been denied to it in nearly all the states.

There are other cults, of minor importance, which have their ardent followers; just as in politics, a man who promises relief can gather about him a smaller or larger following. In medicine the majority of these vociferous Messiahs are deceivers who are dangerous because in disease time is often of the essence; delay while trying quackery may mean the sacrifice of any chance of cure. Therein lies the harm done by quacks.

In my youth men came to the small town in which I lived to sell wonderful remedies in the market place. I well remember the grotesque performances by which they attracted people. The newspapers also contributed to the popularity of quacks and quack remedies. Most older persons in the East will remember

the picture of a man with a bold pompadour and an outstretched forefinger saying "There is hope." Doctor Munyon sold many remedies to cure all ills but for none did he claim as much as for his No. 77, a useless panacea for all diseases.

CHAPTER NINE

MEDICINE AS A CAREER

One of the most interesting characters in George Eliot's *Daniel Deronda* is the blacksmith. Somewhere in the book he makes the statement that for the life of him he cannot see why anyone wants to be anything else but a blacksmith. That is the way I feel about medicine. I felt so when I began and after forty-five years of active medical life I feel so more strongly than ever. I know of course that not all young men or young women feel attracted toward medicine. Their thoughts lie to a large extent in other directions. Nor should I want to see a vast number of young persons study medicine. There would be far too many doctors in the world. Some unkind person might be led to remark in an undertone that such an eventuality would bode ill for the human race.

The desire to study medicine must overcome one like a summer's cloud, like love, like the measles. Usually it seizes a man unawares either because he has grown up in a medical atmosphere or because he admires the family doctor, or because he has read or heard something that has fired his ambition in the direction of medicine.

No one should think of entering upon a medical career who is not willing to work hard as a student and

hospital intern. Whether he works hard afterwards will depend upon his ambition and upon the branch of medicine he chooses as his life's work. He who selects medicine must remember that he will have to be supported by the parental exchequer for more years than if he chooses any other occupation. If he takes the four years of college as most students now do and spends four years in the medical school, as all must do, and then two years in a hospital, as is the custom, he will usually be twenty-eight years old before he can begin to practise, and then if he has the common experience of young doctors it will be three or four years more before his earnings equal his expenses. In other words, he will not be independent before his thirtieth year. This makes the study of medicine a serious economic problem. What can be done about it? The ten years' preparation now required is in my opinion too long. Can it be shortened? Yes, but not in the medical course or in the hospital internship. The shortening must come in the secondary schools and college. It is my personal belief that the preliminary education can be speeded up to gain at the lowest a year and the college course can be made three years, making a total gain of two years. There is nothing sacrosanct either in the four years' high school or in the four years' college course. The usable knowledge imparted in those eight years can without detriment to its content and without irreparable injury to the student's health be condensed into six years. I should like to see a committee composed of college presidents, high school principals and deans of professional schools, study this question not for a few weeks or a few months but after the manner of a Royal Commission in England over a period of years, and then make its report.

Medicine is the most international of sciences and therefore the least nationalistic—hence it is a valuable instrument of peace. Medicine has another advantage —it is of the three learned professions the most democratic. Medicine has no division into bench and bar. The lawyer must pay deference to the judge who intellectually or morally may be his inferior. Nor has medicine a hierarchy as is the case in the ecclesiastical profession. In medicine all men are alike in that there are no castes, no orders, no class distinctions. This is illustrated in the hospital internship—the most democratic institution imaginable—since all interns, no matter what their parental social status, are on the same footing.

Medicine has a further advantage that makes for human progress. It is this: physicians meet in annual conventions which are attended literally by thousands. In no other learned profession do so many eager minds come together for mutual improvement and understanding. At these meetings the university professor, the successful consultant, the famous surgeon has no more right to speak than the most inconspicuous doctor from the tiniest hamlet. I am told by legal friends of mine about the smallness of the annual bar association meetings, albeit there are about as many lawyers as doctors in this country. Moreover, in the opinion of some of these legal friends, the annual meetings are unendurably dull.

Of the clergy I need not speak. They are so split up by sectarian differences that any inclusive, harmonious meeting is *ipso facto* impossible.

The large medical gatherings that occur annually have made of the American medical profession and the Canadian, which is usually included, a united body. If such gatherings could take place on the international

level, they would do much to remove misunderstandings. When men meet together they slough some of their prejudices and develop a greater spirit of tolerance.

Medicine is so large a field that the young doctor soon realizes, especially during his hospital service, that he cannot encompass it all. He must choose a limited field but the range of choice is exceedingly wide —in no other learned profession is there a comparable freedom of selection. In the main, the primary choice lies between medical practice and research. For the man interested in science for its own sake medicine offers a limitless field. Physics and chemistry are so closely allied with modern medicine that he who is interested in either of these fundamental subjects can work all his life in the biophysical or biochemical laboratory.[1] There is no dearth of problems—every solution of a problem creates several new ones. Electricity in the service of medicine, radiology, including the X-ray, radium, the new radiation—neutrons, etc., the artificial radioactive elements—what endless problems await solution in these in part virgin fields. The recent discoveries of W. M. Stanley—isolation and crystallization of plant viruses—call for analogous research along Stanleyan lines on the viruses of human and animal diseases. Another laboratory field is that of pharmacology. This science is engaged in studying the action of new drugs supplied in such profusion by the organic chemist; it also advances our knowledge of physiology and within the last few years has contributed enormously to our understanding of the sym-

[1] At the present time a number of men teaching these subjects in medical schools and pursuing investigations in them, are not medically trained. While they are entirely adequate to their task, I believe it would be an advantage to them as well as to pedagogy in their branches, if they had passed through the medical course.

pathetic nervous system. The field of the ductless or endocrine glands demands intensive research, partly for its own sake, partly because the public is more or less "hipped" on "glands" and wants to know more about them.

None of these sciences can progress as it should without experiments on animals.[2] Unfortunately there are misguided sentimentalists who would prohibit or limit such experimentation. For this mistaken attitude, which in the last analysis puts the animal above the human being, ignorance of medical history is responsible. This is one of the reasons, by no means the chief one, why I advocate the teaching of the history of medicine in college and high school.

Unlike the other learned professions medicine is constantly working toward its own disadvantage by striving to eradicate disease—to lessen the opportunities by which it lives. That is, however, what one would expect of a profession that, springing from the priesthood, has from its very beginning had the highest ethical ideals.

By medicine in the restricted sense is meant the sphere of the general practitioner. What does general medical practice have to offer? To youth, searching for philosophy and adventure, it may seem at first a dull business—dealing everlastingly with the sick, the complaining, the neurotic; the small ailments of the rich, the tragedies of the poor. While the answer to such a plaint might be *de gustibus*, it might also be, that all careers can be lived greatly—and medicine above all. For the doctor in love with his profession every patient lends his personality to the weaving of a philosophy of

[2] Certainly no new drug can or should be put upon the market until it has been proved safe for man by tests on animals. As I have already stated, if this had been done in the case of elixir sulphanilamide more than eighty lives would not have been needlessly sacrificed.

life. A doctor's life is one of constant learning, just begun at the close of medical school. His teachers are the people of all degree, whom he meets in the intimate traditional relationship of physician and patient, a relationship absent from the businesslike work of the specialist. Perhaps general practice is not for the man who loves his ease, who wants his afternoons for golf or tennis, and his nights for bridge. In choosing general practice the young man must be prepared to make constant sacrifices, and his wife, if he has one, must likewise be willing to make sacrifices. The first few years will be lean years and will bring many disappointments, but they should act as a stimulus, not as a check to effort. The oft-quoted adage, "Nothing succeeds like success," always has seemed to me wrong—"Nothing succeeds like failure" is nearer the truth.

Bedside study although practised for thousands of years has not exhausted the problems offered by the ill patient. There is much fascinating work to be done, many riddles to be solved, more easily solved when bedside and laboratory are combined. There are even undiscovered diseases, or undescribed diseases which will reveal themselves to the lynx-eyed doctor of the future.

Surgery today is a highly scientific branch of medicine, no longer the carpenter's or butcher's trade it was in former times. Our great surgeons are capable physiologists, often successful investigators who infuse into their work an element of true science. Many young men are attracted to surgery by its spectacular performances, a few by the emoluments they hear of during their student or hospital years.

The various specialties of medicine, which I need not enumerate, have the advantage that the doctor's time is more nearly his own; night calls are rare, and the

monetary rewards are considerable. In addition many of the specialties offer abundant opportunities for scientific research, for which the specialist, in the nature of his work, will have more leisure.

Industrial medicine is of recent growth. Large corporations have found it to their advantage to employ physicians for the purpose of examining applicants for jobs and for looking after the health of their employees. This type of work is beginning to develop into a specialty and as it does so it will enlarge and dignify its own field.

Among public services I have particularly in mind public health work, which is almost a virgin field with unlimited opportunities both for research and for the practice of preventive medicine. Up to the present this type of work has not attracted, except in the government services—national health, army and navy—as many good men as the country needs. One reason is that our citizens have not realized the importance of appointing men trained in public health work to responsible places in health departments. We find that even in large metropolitan districts and even in state health departments, appointments are frequently made on a political basis, the appointees being taken from the ranks of general practitioners, surgeons or medical specialists. To some extent our medical schools are responsible for the impasse in which we are, because they have not trained an adequate number of real health officers. When they do so, cities will have less excuse for their failure to select proper men. I am hoping that with a growing intelligence in Federal, state and municipal governments there will be a greater demand for trained health officers and that the appointing powers will follow the English custom of selecting men possessing the degree of Dr.P.H., Doctor

of Public Health. Besides receiving an adequate salary such an official must be assured of security of tenure.[3]

There is one other medical pursuit of which I should speak, and that is medical teaching. Teaching is a gift. The teacher like the poet is born not made. Medical teaching has all the charm that any other teaching has for the born pedagogue, plus the fact that of all human pursuits medicine is the least static.

Today in our medical schools there is a tendency toward what is called full-time teaching, that is, the teachers do not practise outside the hospital and devote their whole time to teaching and research. In some institutions the occupant of the chair, whether it be medicine or surgery, may do a minimal amount of consulting practice. To the man who prefers the academic life to life in the market place I would recommend full-time teaching in a medical school. Like a large number of my contemporaries I have combined teaching with an active medical practice, and I must say that my life has been thrilling and that I have never been bored.

Medicine need not become a career, it may be only an antechamber to a career. Being so largely a science, many naturalists and authorities in other fields studied medicine and found the preparation ideally helpful. I need only mention Galvani, Darwin, Huxley and Helmholtz.

The rewards of medicine are twofold, tangible and intangible. For the vast majority of the profession the

[3] In general, what I have said about the appointment of health officers also applies to the appointment of medical examiners and coroner's physicians. In many of our large cities the opportunities for valuable study offered by deaths from accidents, homicide or suicide, are totally wasted because the public official appointed on a political basis usually lacks the requisite training.

tangible rewards, the income in dollars, are small.[4] It is only the leaders who have considerable incomes and only a few of them leave a substantial fortune at death. The accumulations of a lifetime of medical practice do not compare with those attained in a few years by industrialists, public utility officials, department store owners or movie stars. But when it comes to intangible rewards conditions are reversed, for the doctor then is at the head of the entire procession of workers, whatever their field may be. The affection of his patients and the respect and trust of his colleagues come to him if he deserves them and they are the greatest and most enduring rewards of life.

Granted intelligence and industry, some men fail by too great meticulousness, especially in writing; much that is planned never gets done because an excessive amount of time is spent in the polishing process. The truly wise man will know how to steer between the Scylla of the struggle for perfection and the Charybdis of the desire for achievement.

The end of man is happiness, and happiness is based on what President Eliot called the durable satisfactions of life. Happiness cannot be made for us by others—not permanent happiness. Every man must forge it for himself. But how? First of all, he must have an objective, whether that is to be a good blacksmith, a good doctor, a good teacher, a good farmer, a good merchant. In other words, a man must have a purpose in life. But that is not explicit enough—his purpose must

[4] I am reminded of a story I heard many years ago. Doctor Reilly was practising in a small town, having his office above a store. His sign read: Doctor Reilly, Office Upstairs. In time he died, leaving just enough to bury him, but nothing for a tombstone. The people he had served for many years, most of whom had owed him money, soon forgot him. One day a citizen more thoughtful than the rest took the old sign, nailed it to a post and stuck it in the grave. And there it read: Doctor Reilly, Office Upstairs.

be one about which he has neither a conscious nor a subconscious conflict. The purpose must be the expression of the whole individual and of the mature man. It often happens that parents intentionally or unintentionally steer their children into an occupation—profession or business—which is not their children's prime desire. The son or daughter will have an objective, but deep down there is a conflict between a cherished ideal and the day's work. Such an individual is a divided self and can never reach the highest degrees of satisfaction in life. Parents should bear these things in mind and avoid forcing a square peg into a round hole. In a general way it is a grievous mistake for parents to bring up their children in the light of their own generation. Unfortunately they often fail to see that they are doing this. It is to the credit of psychoanalysis that it has thrown a searchlight on the relation of parents to children and has brought into consciousness those things that create difficulties for both.

There are, I believe, just three things parents should provide, or should try to provide for their children: health, education and standards of integrity. Beyond these children should be allowed to stand alone and to walk with heads erect along a clearly seen path, interfering with no one and permitting no one to interfere with them.[5]

[5] George Otto Trevelyan, *Early History of Charles James Fox* (New York and London, 1901), draws a beautiful picture of home life in a cultured family that may well be reproduced here. Speaking of Fox he says, "Fox had been brought up in a home where intense and tender conjugal affection was rendered doubly attractive by the presence of good sense and that perfect good breeding which is unconscious of its own existence."

CHAPTER TEN

THE FAMILY DOCTOR

From time immemorial the family doctor was the man looked up to by the whole community. He knew his people and within the range of his knowledge understood their ailments. On horseback with his saddle-bags or on foot or in a lumbering carriage he visited his patients for miles around, bringing them comfort even when with his limited means he could not bring them health. His type has often been represented in literature—by Balzac in his *Country Doctor*, as Willum McClure by Ian McLaren, as Doctor Winter by Conan Doyle, and best of all by Robert Louis Stevenson as the man who had fewest of the vices and most of the virtues of our race.[1]

[1] The following is Stevenson's tribute in full:

"There are men and classes of men that stand above the common herd: the soldier, the sailor, and the shepherd not infrequently; the artist rarely; rarelier still, the clergyman: the physician almost as a rule. He is the flower (such as it is) of our civilization; and when that stage of man is done with, and only remembered to be marvelled at in history, he will be thought to have shared as little as any in the defects of the period, and most notably exhibited the virtues of the race. Generosity he has, such as is possible to those who practise an art, never to those who drive a trade; discretion, tested by a hundred secrets; tact, tried in a thousand embarrassments; and what are more important, Heraclean cheerfulness and courage. So it is that he brings air and cheer into the sick-room, and often enough, though not as often as he wishes, brings healing."

Thomas Dekker (1570-1641) wrote as follows about the physician of his day: "Make muche of thy Physitian: let not an Emperick or Mounti-bancking Quacksaluer peepe in at thy window, but set thy gates wide open to entertaine

I have just used the phrases "within the range of his knowledge" and "limited means." How limited is well illustrated by a chapter in the famous autobiography of J. Marion Sims who was graduated from Jefferson Medical College in Philadelphia in 1835, without ever having had a chance to treat a patient. Called to see the sick child of the leading citizen of Lancaster, South Carolina, where he had located, he found himself utterly helpless. He knew neither what ailed the child nor how to treat it. When that child died and then another in the same house, Sims was so disheartened and so disgusted with medicine that he threw his shingle in a well and went forth to seek his fortune elsewhere and in another sphere of life. Happily, through a fortuitous circumstance, his medical career had a second and more auspicious beginning; in due time Sims became the greatest pioneer in the specialty of diseases of women.

The family doctor of seventy-five and even of fifty years ago was a jack of all trades as far as medical practice was concerned. He treated medical diseases to the best of his ability; performed minor surgical operations, and in many instances cut for stone in the bladder, a disease more common formerly than it is now. While major surgery was a specialty, it was not an exclusive one, and many of the leading surgeons did a complete general practice.

Wonderful little, when all is said,
Wonderful little our fathers knew.
Half their remedies cured you dead—
Most of their teaching was quite untrue—
'Look at the stars when a patient is ill,

thy learned Physitian: Honour him, make much of him. Such a Physitian is God's second, and in a duell or single fight (of this nature) will stand brauely to thee."

(Dirt has nothing to do with disease),
Bleed and blister as much as you will,
Blister and bleed him as oft as you please.'
Whence enormous and manifold
Errors were made by our fathers of old.

Yet when the sickness was sore in the land,
And neither plant nor herb assuaged,
They took their lives in their lancet-hand,
And, oh, what a wonderful war they waged!
Yes, when the crosses were chalked on the door—
Yes, when the terrible dead-cart rolled,
Excellent courage our fathers bore—
Excellent heart had our fathers of old.
None too learned, but nobly bold
Into the fight went our fathers of old.

RUDYARD KIPLING.
Rewards and Fairies.

When I began to practise as a family doctor my task, like that of my contemporaries, was very different from what the task of a family doctor is today. In the first place, the vast majority of the sick were treated at home, and as it was before the days of the automobile, my practice like that of my colleagues was chiefly local.[2] That the patients were treated at home was due in part to a wide-spread fear of hospitals. The hospitals of that day were vastly different from our modern institutions—the wards were dirty and dingy; the nursing indifferent or poor; the food generally bad—only

[2] In the district of Philadelphia where I began to practise medicine, called the Northern Liberties, there lived a Doctor Bournonville, who had retired shortly before I came upon the scene. Doctor Bournonville, it was said, would tie his horse at a street corner, walk up one side of the street, cross over, go down on the other side and get into his carriage, having in the meantime visited almost every house in the block. That was his day's work, barring an emergency or a confinement.

the sick and helpless paupers would go to them. There were of course no X-rays, no electrocardiograph, no basal metabolism, and none of the many things that give to the hospital a vast superiority over the home.

The doctor, therefore, would go from house to house to treat his patients who might be suffering from typhoid fever, tuberculosis, pneumonia, measles, scarlet fever, diphtheria, dysentery, and other diseases not then definitely named. He would also bring children into the world, for it had not become a custom for rich as well as poor to go to hospitals to be confined. What a change from that day to this! Typhoid fever has virtually disappeared—through purification of the drinking water, through recognition of carriers, through vaccination, a better personal hygiene, and antisepsis.

In Philadelphia, prior to the introduction of filtration of the drinking water, many doctors made a comfortable living merely from the typhoid cases in their practice. Yet physicians were the strongest advocates of filtration. I remember that one of my friends practising in the Kensington district had at one time fourteen typhoid fever patients in his care. Even with the small fees of that day, he had a good income from that practice alone. Filtration cut that source of revenue to nothing; he gave up family practice and took up a specialty.

While what I have said of typhoid fever does not apply to tuberculosis, that disease is also fast disappearing; from having been at the top of the causes of death, it has been reduced to sixth, a miracle of hygiene and medical effort. Diphtheria is even rarer than typhoid fever; many doctors of today never see a case. Measles and scarlet fever are gradually being controlled by some form of immunization. Dysentery and summer

diarrhea, the latter the bane of child-life, are no longer a menace due to the pasteurization of milk, purification of the water supply, and general improvement in methods of handling food.

While many women are still confined at home—in many instances by midwives—there is a growing tendency to go to hospitals for the delivery and to leave that function to the obstetrical specialist.

Another influence that has worked for the elimination of the doctor of the old school is the rise of specialism in medicine. A medical Rip Van Winkle who had slept fifty years would be speechless with amazement if he saw that the diseases he treated unaided—all the infections, disease of the heart, lungs, nervous system, and the skin—were now being largely treated by specialists. And more than that: diseases entirely unknown to him have risen to the dignity of specialties, such as allergic conditions, diabetes, arthritis and diseases of the peripheral blood vessels.

And there is still another factor that has altered the status of the family doctor—the laboratory. The doctor of the old school had done his duty when he counted the pulse, took the temperature, listened to the heart and lungs, and examined the urine. How far would a man get today with such simple procedures? The laboratory studies required and often expected by our patients are as a rule beyond the doctor's equipment and training; he must call in the X-ray expert, the technician to make studies of the blood; the electrocardiographer, the basal metabolism technician, the bacteriologist, the allergist, the urologist—the number of specialistic studies is constantly on the increase. It is evident that there is thus no place for the old-time family doctor; the word doctor today has no more definite meaning than the word engineer, who may be

a mechanical, mining, civil, electrical or chemical engineer.

Is the family doctor then an anachronism, a superfluity? By no means; he is even more useful than was his predecessor, but in another way. His function in the new day is less that of healer and more that of conservator of health, of coordinator or integrator. The multiplicity of specialists makes a coordinator a necessity. There must be someone to harmonize and evaluate the opinions of the various specialists—sometimes a dozen or more—who take part in a complete examination of a given individual.

One often hears specialism criticized or ridiculed. That attitude is scarcely justified. More progress has come to medicine through specialization than would have come to it in any other way. It is true men often proclaimed themselves specialists who did not have the requisite training. The organized medical profession has recognized this fact and has established, or is in process of establishing, examining boards to prescribe and to test the qualifications of those who want to practise a specialty.

It has also been charged to specialists that they magnify their importance and see the patient only from their own limited angle. There is some truth in this.[3] The best safeguard against such a one-sided view is the requirement that anyone contemplating entrance into a specialty must have some preliminary training in general medicine. If the special boards are wise they will insist on such training as a prerequisite to license. To some extent the hospital internship provides that invaluable and essential experience.

[3] However, Bliss Perry (*And Gladly Teach*, Boston, 1935) fails to appreciate what specialism has contributed to medicine when he says: "Speaking of specialists, of course their advice is sound, most of it, except the cardiograph's, is to be found in Cicero's *De Senectute*."

But no specialist, however skilled he may be, can coordinate all the findings of his specialist colleagues for the good of the patient. That can be done only by one who, while not a specialist in the narrow sense, knows something of all of the specialties and at the same time has the psychologic insight and the willingness to understand the patient as an integer, not as a thing of shreds and patches. Modern psychology must be as much a part of thinking as the Darwinian theory was of the thinking of our fathers. This then is one of the tasks I foresee for the doctor of the new school. But there is another, a greater task. Being no longer called upon to treat illnesses that have disappeared or are rapidly vanishing, his work takes on a new orientation —that of guardian of health rather than curer of ills. For after all

> "*To guard is better than to heal,*
> *The shield is better than the spear.*"

As Doctor John A. Ryle has said: "The preservation of health as a primary function, with the treatment of disease as a secondary function, should become the new ideal."

As guardian of health the doctor will see his responsibility in the main as twofold: first, to protect his clientele, if I may use that word, against preventable diseases by every form of efficient protective vaccination; and secondly, by means of periodic health examinations, in which he may have to be assisted by specialists, to bring to light latent diseases, in that way directly or indirectly contributing to health and the prolongation of life.

In order that he may carry out these great functions, he must receive such instruction in the medical school as will fit him for his new tasks. Not all medical institu-

tions are alive to their altered responsibilities; in fact, the training of this new type of family doctor is a problem that has received but little attention from the medical schools. For a discriminating choice of specialists involves two uncommon skills: diagnostic ability and a knowledge not detailed, perhaps, but adequate, of the content and value of the various specialties. Lacking this, the family doctor becomes merely a feeder for specialists, sending his patients through a mill in the hope that something will turn up —a fishing expedition. Many of our medical schools have concentrated on the training of specialists and research workers, neglecting the equally essential task of training this superman family doctor, who knows something of all the specialties, and with psychologic insight and diagnostic skill, guides his patients through them when necessary. Furthermore, medical schools must emphasize in their curriculum the importance of preventive medicine, must stress not only the ways of banishing disease in the individual but also those of conserving his health. These two ways are not identical and require different types of approach. The idea of prevention involves many functions—some are carried out by the health authorities of city, state and nation; others fall to the task of the individual physician. To the latter belongs the so-called health examination.

The family doctor's dignity will increase if he becomes a conservator of health. He will have more office than home practice, which is a desirable thing. He will have time for hospital work, for medical societies, for postgraduate study, and for pleasures that were denied to the doctor of the old school. He may have a chance to learn to know his little children and be his wife's companion rather than merely her banker.

CHAPTER ELEVEN

MEDICAL ETHICS

MEDICAL ETHICS is a complicated subject which produces frequent and at times explosive outbursts. The doctor almost daily encounters the layman's reaction to it, which is that medical ethics is a secret, sinister code designed for the patient's disadvantage. That is a wholly false and unjust interpretation of a rule of conduct based on thousands of years of experience and embodied for not quite a century in a printed code known as the Code of Ethics.[1] The uninformed layman, even if intelligent, unequivocally condemns medical ethics when it crosses his wishes; if, however, the facts are explained to him, he may come to a different and juster point of view, as is shown in the following incident.

Last summer a medical colleague asked me to see with him a refined and intelligent lady suffering from high blood pressure and other ills. After my examination was completed the doctor and I consulted with complete frankness in the presence of the lady's husband. Personally, I believe in open consultations openly arrived at, to paraphrase the winged words of a great Princetonian. The next day the husband came

[1] Thomas Percival, an Englishman, printed a code of ethics for private circulation in 1794; it was published in 1803. In this country the first official Code of Ethics was drafted by the American Medical Association in 1847.

to see me to ask that I take complete charge of his wife. When I told him to do so would be dishonorable, he began at once to denounce "medical ethics."

"Is it right," he almost shouted, "that through medical ethics the patient should have to suffer?"

The explanation I gave to the irate gentleman, which in the end satisfied him, was as follows: The doctor who called me paid me a compliment in doing so; he trusted me. Moreover, he was entirely willing to be guided by my suggestions. Would it not be a breach of confidence if, after he had introduced me to the patient whom I had never met before, I should displace him? Would you call that a gentlemanly thing to do? He admitted he would not. I asked further whether, if he were in the doctor's position, he would ever call me again to see one of his patients in consultation. That point he also saw. In the end he agreed that medical ethics as applied to his wife's case, which represents one of the commonest controversial issues in daily practice, was altogether just and sound. What was done in this specific instance was simply this: I agreed to come if the doctor would come to the patient's house at the same time. That was satisfactory to all concerned.

Patients often ask, "Can't I have any doctor I want?" No, there are certain amenities, call them medical ethics, that make the ruthless taking of another doctor's patient a dishonorable act. Any doctor has a right to answer an emergency call, but after he has done what is necessary, he is in honor bound to notify the family doctor and to turn the patient back to him. Only if the family doctor requests it can he continue his care of the patient. Were it not for that, medical practice would be a cut-throat business as a result of which the public would in the end be badly served, served by ra-

pacious men of the lowest principles—men of the type of ambulance chasers who have so degraded the legal profession.[2]

If during the course of an illness the patient wants to change doctors, he can do so by informing the one taking care of him of his intention. It is naturally not a pleasant experience for the discharged physician, especially not if he has given the best he could, but he will submit gracefully, for it is something he had to expect when he became a practitioner of the healing art.

I have spoken of consultations; they are often criticized because carried on behind closed doors. What I said above as to open consultations in the presence of a member of the family is not without exceptions. There are conditions found which, were they communicated to the wife or the husband, might wreck a family; that is one reason for secret conferences. Then there are cases which are so obscure that it is only by a lengthy consideration, bringing in all the possibilities, that a decision is finally reached. It would be of no advantage to a member of the family, more likely very disturbing to his mind, to "sit in" during such a discussion, especially if several doctors are consulting. I have been in cases in which much of the wife's troubles were due to the husband's bad habits—it would hardly be tactful to discuss that phase in his presence. All in all, no fast rule can be laid down, but I favor a frank, open consultation whenever the circumstances permit.

Quite often after a doctor has seen a patient a friend of the latter will buttonhole the doctor and ask, "What

[2] There is an ethics in the law somewhat comparable to medical ethics, although less involved and complicated. A lawyer who has accepted a retainer from a client and has heard his side of the case cannot, if he is an ethical lawyer, resign and serve the other person to the quarrel.

do you think is the matter with Mrs. X?" And if the doctor declines to answer the inquisitive individual will at once make a verbal onslaught on medical ethics. Such a person has no insight, no real understanding. One of the oldest rules of a doctor's life is to keep professional confidences inviolate. It is part of the Hippocratic Oath.

There may occasionally be instances when a doctor carries medical ethics to excess, leaning too far backward, but immemorial experience has shown that medical ethics is in actuality no more than a code of honor in an honorable profession which redounds to the advantage of the public as much as to the advantage of medical men.

It is part of medical ethics that a doctor should not give harmful medicine and should not perform nor advise the performance of a harmful or useless surgical operation. Because the laity instinctively know this ethical trait of the medical profession, they freely entrust their health and their lives to medical men.

There is another phase of medical ethics that many outside of the profession know little or nothing about. It is the noble principle that the doctor who makes a discovery or invention must give it freely to the world. That is one of the finest tenets in our ancient code which is rarely transgressed. Many opportunities for getting rich by keeping a method of treatment secret have presented themselves—but rarely has the discoverer patented his discovery for his own advantage. If he did, he either left the profession voluntarily or, if he remained in it, he was ostracized by his right-thinking colleagues. Let us suppose Minot, the man who discovered the almost miraculous liver treatment of pernicious anemia, had kept it secret, as of course he did not, would he not by now be a multimillionaire?

Or if Banting, as he did not, had patented insulin for his own benefit, would he not be the richest doctor in the world? During the World War the importation of Salvarsan or 606, from Germany ceased. Three friends of mine succeeded in making it in this country and, although selling it at a low price, they soon amassed a fortune. By any standard of conduct except medical ethics they could have kept this money—but did they do it? No, they established a research foundation which is flourishing on the income of the fund.

One other question of ethical import often arises: shall the doctor tell the patient the truth? It is easy enough to say categorically, yes—everyone, even the doctor, should always tell the truth. But the matter is not nearly so simple. Many a patient has come to me saying, "Doctor, I want you to tell me whatever is wrong with me." Does he really want to know? T. S. Eliot has expressed the patient's psychology very well in these words: "The sick man does not know what is wrong with him; he partly wants to know, and mostly wants to conceal the knowledge from himself."[3] Personally, I have made it a rule to tell a patient the full truth if I find a communicable disease, such as tuberculosis, since if he did not know it, he might infect others. Secondly, I would tell a patient if he had a serious affection, such as heart disease, if I found that he was careless of himself and needed to be scared a little in order to behave. Thirdly, a business man, any one in fact whose end is approaching, should be thoughtfully and tactfully informed of his danger so that he may arrange his affairs properly. And finally, anyone who insists should be told—after all, he is entitled to the information he has come to get.

[3] Introduction to *Nightwood*, by Djuna Barnes.

In what circumstances is a doctor justified in suppressing the full truth? If he knows the patient's psychology and is convinced that a knowledge of the height of his blood pressure would depress him, he is warranted in withholding the full truth. Sometimes patients are wrongly told that a certain high pressure—let us say, over 200—means death. Would the doctor who finds it 220 or 240 be justified in telling the frightened patient, knowing full well that life is compatible with such blood pressure? I recall a relevant circumstance. One of my patients whose blood pressure was above normal but not seriously so, became ill at home and sent for me. As usual, I took his blood pressure. "Doctor," he said, "I want you to tell me what my pressure is." He had never previously asked to know, and aware of his psychologic make-up, I had not told him. His wife, who was present, chimed in, "Yes, Doctor, I think he ought to know." Of course, he had a right to know the truth, and I had no choice but to tell him. The pressure, on account of the man's pain, happened to be a little higher than usual. When he heard it, his face elongated, he became pale and silent. I explained to him and his wife that high blood pressure by itself was not a serious thing, and left them somewhat relieved. Now, that patient did not really want to know he had a high blood pressure; without expressing it to himself, he had expected a normal or nearly normal figure. I have taken his blood pressure many times since, when he was alone and when his wife was present but never has either asked me again.

Doctors have consulted me who had definite symptoms of angina pectoris, a Damocles sword. They wanted to know the truth, but would in conversation remark, casually as it were, that they believed the trouble was intercostal neuralgia. No definite rule can

be laid down for such cases, but it must be evident to any intelligent person that the doctor really did not want to know; he wanted to be told it was intercostal neuralgia. If the patient will take the care he should, when his trouble is angina pectoris, why make him totally unhappy counting his days? The humane physician will prescribe the proper regimen—and the doctor will probably live longer, even to a good old age.

The doctor is often justified in telling a white lie, but for his own protection as well as on the score of truth he should inform a member of the family of the true situation whenever he conceals it from the patient himself. One other matter in this connection—the doctor must not destroy hope if he can avoid doing so.[4]

It sometimes happens that a patient recovers from an illness a doctor had pronounced fatal. But even in hopeless cases, especially in children, parents resent it if the doctor says, "Your child will die; I can do nothing." They want the doctor to fight with death to the end, short of inflicting useless torture upon the child.

I hardly ever ride in a street car but I hear some persons talk about sickness or doctors. Next to the weather, it is the favorite subject of conversation. On the whole, the doctor enjoys a good deal of respect, even though he is freely criticized for this or that omission or commission. If a lawyer loses a case, except it be one invested with a public interest, few persons know about it, but if a doctor loses a patient, the crêpe on the door tells the neighborhood what has happened. People, by and large, are concerned only with results. If a patient recovers, well and good, but if he dies, it is regrettable, and may be charged against the doctor. In the first

[4] Dante proved himself a profound psychologist when he put over the entrance to his Inferno: "Lasciate ogni speranza, voi che intrate."—Leave hope behind, all ye who enter here.

case, the treatment and diagnosis may have been simple; perhaps a diagnosis was not made. In the second case, the doctor after a long and careful study may have arrived at a profoundly skilful diagnosis, but for that he rarely receives the proper credit. However, he is not working primarily for credit. He is working to satisfy his own ideals, and if in a difficult case he has made a correct diagnosis and has carried out the proper treatment to the best of his ability, regardless of results, he has that greatest of all rewards, inward satisfaction.

CHAPTER TWELVE

PREVENTIVE MEDICINE

PREVENTIVE medicine as a public function goes back to remote ages, but it did not become a definite, planned objective until the fourteenth century when the spread of the Great Plague led to the institution of quarantine. Ships coming from infected ports were detained, first at Ragusa on the Dalmatian coast, for forty (*quaranta*) days; hence the word quarantine.

The next significant step in the direction of preventive medicine was the introduction of inoculation against smallpox in Western Europe through the efforts of Lady Mary Wortley Montagu. Smallpox had always been one of the most devastating diseases; those it did not kill, it marked for life. Few were the individuals who were not pitted by the disease. Inoculation with material from a pustule of a smallpox patient usually produced in the inoculated person a mild form of the disease and conferred permanent immunity. It was, however, a haphazard method often attended by serious complications. In 1796 a new method came into vogue, that of vaccination, the immortal discovery of Edward Jenner. By inoculating with material from cowpox, the individual, without passing through a serious illness, is rendered permanently immune to

smallpox. Vaccination has practically eradicated the dread disease which in periodic epidemics caused death and disfigurement to vast numbers in this and other countries. There are persons, as I have stated in a previous chapter, who wilfully ignorant of the incalculable boon conferred by vaccination, oppose the practice and seek to abolish by law compulsory vaccination. They little realize that an unvaccinated population would be a ready prey to the disease if it were ever introduced. They must not be allowed to succeed.

The eighteenth century gave us another large-scale method of disease prevention. Scurvy was an incapacitating and often fatal disease prevailing on ships and in prisons and other crowded places. It was the greatest enemy to long sea voyages. No one knew its cause, but an ingenious Scotchman, James Lind, as already mentioned, found that it could be prevented as well as cured by lemon juice. As a result of this discovery the British Admiralty in 1795 commanded the inclusion of lemons or limes in a ship's stores. From that moment scurvy disappeared from the British navy. Many must have wondered what there was in lemon juice that prevented scurvy. It was about one hundred years later that a Dutchman in Java named Eijkman began the work that led to the discovery of the reason lemon juice prevents scurvy. Experimenting with chickens he found that if they were fed on polished rice they grew sick, but when unpolished rice or rice polishings were given they recovered. A human disease in the Far East called beriberi was also found to be due to the use of polished rice; rice polishings would bring about a cure or would prevent the disease. This discovery enabled Japan to wipe out the crippling disease of beriberi entirely from its navy. Beriberi and scurvy are only two of a number of diseases that are due to the

lack of so-called accessory foods or vitamins in the diet. These vitamins need to be present only in infinitesimal amounts, but they cannot be dispensed with wholly. They are designated by the letters of the alphabet and are rapidly increasing in number. Many of the troubles of the human race today come from a lack of the proper vitamins.

About the middle of the last century, Ignaz Philip Semmelweis, an obstetrician in Vienna, added another preventive practice to those then in vogue. At that time the majority of women who entered the Vienna hospitals in order to be confined died of childbed fever. Semmelweis' observation led him to the conclusion that this tragic result was due to the fact that doctors would go from the dissecting and autopsy rooms directly to the delivery rooms. So obvious as this connection is to us today, the idea was ridiculed by his colleagues; poor Semmelweis could not bear the treatment he received and died insane. His tragic life story is told with passionate comprehension by Louis-Ferdinand Céline in Mea Culpa.[1] In our country, Doctor Oliver Wendell Holmes had, even a year before Semmelweis, called attention to the same situation; he too was laughed at and was content to drop the matter.

The next and greatest step in preventive medicine came with the discovery of the germ causes of disease, a discovery made possible by the demonstration of Louis Pasteur that spontaneous generation of life did not occur. Prior to the time of Pasteur it was believed that putrefaction and fermentation were brought about by the spontaneous generation of life in the putrefying or fermenting material. Toward the middle of the seven-

[1] Translated by Robert Allerton Parker. Little Brown & Company, Boston, 1937.

teenth century even maggots and grubs were believed to develop spontaneously in decaying matter. An Italian naturalist, Francesco Redi (1627-1697), exposed meat in jars, some uncovered, others covered with parchment and wire gauze, and showed that only in the uncovered meat did maggots develop. In the protected jars maggots were found on top of the covering material. While Redi's experiments proved that, as far as grubs and maggots were concerned, they did not arise spontaneously in putrid meat, it remained for Pasteur to show in 1862 that the decomposition of organic liquids was likewise not due to spontaneous generation of some vegetative force as it was called. His ingenious experiments are familiar to all who have read the thrilling biography of Pasteur by his son-in-law, Vallery-Radot. As has always happened to pioneers and reformers, Pasteur's work was ridiculed by his Parisian fellow scientists, but they are forgotten, while Pasteur is held to be the greatest Frenchman of all time.

The pioneer work of Pasteur was followed by that of Robert Koch, also a star of the first magnitude in the medical firmament. Koch and his immediate followers discovered the causes of many infectious diseases—tuberculosis, typhoid fever, meningitis, pneumonia, wound infection and blood poisoning, erysipelas, boils, abscesses, carbuncles, tetanus or lockjaw, and gonorrhea, while the French army surgeon Laveran in Algiers revealed the long-sought cause of malaria.

The new knowledge was breath-taking. It led to new methods of prevention but also to a somewhat erroneous concept. Medical men began to see in bacteria the sole cause of disease—germs were all-important. They forgot for more than the span of a generation that seed needs soil, that though bacteria may be taken

into the body, they can only grow and produce disease in that body which offers them a favorable soil. In more recent times medicine has come back to an appreciation of the human constitution as an essential element in disease. That subject is, however, much more difficult than the study of bacteria, their properties and habits.

A natural outcome of the discovery of the bacterial causes of infectious and contagious diseases was agitation for the purification of the water supply of communities; later came insistence on pasteurization of milk, and still later public control over the handling of milk from cow to consumer. The dangers lurking in foods eaten uncooked led to wise food laws. Contagious disease hospitals increased in number, and by enabling authorities to isolate patients suffering from contagious diseases, the spread of these diseases was prevented. An important epidemiological fact first discovered in the case of malaria was that the germ causes of some diseases are conveyed from the sick to the well by the bite of mosquitoes or other insects.

The story of yellow fever is well known. After the Spanish-American War, a group of officers of the United States army—Reed, Carroll, Lazear, and Agramonte—undertook a study of the yellow fever problem in the hope of stamping out the disease which the proximity of Cuba to our shores made a perpetual menace to this country. By a process of scientific investigation scarcely equalled in history they finally proved that yellow fever, like malaria, was conveyed from the sick to the well by a mosquito. With that discovery, the means of prevention were given—mosquito control, screening of homes, protection of individuals.

Two brilliant results flowed from the application of these methods: Yellow fever disappeared from Cuba

where it had existed for centuries, and General Gorgas, by applying the same principles in Panama, made the building of the Panama Canal a possibility. The French had failed because, ignorant of the methods of prevention, the Canal diggers had succumbed in vast numbers to malaria and yellow fever.[2]

What preventive medicine has accomplished in diphtheria constitutes one of the proudest achievements of our era, something undreamt of when I began the practice of medicine. In 1890-94 before the discovery of antitoxin, there occurred in New York City 134.4 deaths in a hundred thousand of population from diphtheria; in 1937 only 0.8 deaths in a hundred thousand of population. It is a distinct reflection on the health authorities of a city if the diphtheria or the typhoid fever incidence reaches any considerable proportions.

Preventive medicine has achieved wonders in lessening the incidence of the Great White Plague, tuberculosis. The sources of infection in this disease are mainly through human contact, direct or indirect, and through the milk of tuberculous cows. Destruction of infected cattle and pasteurization of milk have practically abolished the second source. The elimination of the first, not yet wholly achieved, is brought about by recognizing the methods of infection—principally the sputum of tuberculous individuals. Every tuberculous person who coughs up sputum is a source of danger for those who come in contact with him. The

[2] The malaria mosquito is the Anopheles; that transmitting yellow fever belongs to a different species and is called Aedes Aegypti (Stegomyia Fasciata). It should perhaps be stated that long before Reed's wonderful work, the idea that the mosquito might play a rôle in the transmission of yellow fever had occurred to several perspicacious minds—to Josiah Clark Nott of South Carolina and especially to Carlos Juan Finlay of Havana. Recently, in Brazil, two other and hitherto unsuspected species of mosquitoes have been found vectors of yellow fever.

discovery of such patients and their treatment either at home or in sanatoria removes the greatest of all dangers in this disease. Treatment involves not alone technical procedures, but intensive education in the means of protecting others.

Doctor Lawrence F. Flick of Philadelphia many years ago pointed out that tubercle bacilli may remain alive in houses after the patient who had tuberculosis has died or has removed to another house, and that new occupants may become infected. Better housing, better food, sunshine, recreation—all these help in lessening the susceptibility to tuberculosis. Vaccination has been tried in the last few years and has been applied principally to infants, the material being an attenuated harmless culture of an avian tubercle bacillus. This vaccination prepared originally by Calmette and Guérin of the Pasteur Institute of Paris and called B.C.G., has not yet had an extensive enough trial, but some of the results are encouraging.[3]

For that dreaded disease, infantile paralysis, the method of vaccination has so far not been successful; in fact, it would appear as if in a few instances the vaccine had produced an attack. Recently, the use of a certain antiseptic solution in the nose has been advocated—whether it is of value can be determined only during an epidemic outbreak of the disease which, let us hope, will not occur again.

The question might be asked: Has anything taken the place of these vanishing diseases? There are a few so-called new diseases, new perhaps because they are now recognized as independent affections. For example certain forms of meningitis, some blood conditions such

[3] A few years ago, owing to a fault in technique, a large number of infants in the city of Lübeck died of tuberculosis after vaccination with B.C.G. Investigation proved that the material had not been properly prepared and contained live virulent tubercle bacilli.

as agranulocytosis, and sleeping sickness or lethargic encephalitis, a disease that must have occurred in earlier times but had not attracted attention until the World War. It is one of the most dreadful diseases in its aftermath. New in a certain sense are tularemia, undulant fever, Rocky Mountain spotted fever, rat bite fever, and psittacosis, all diseases acquired through animal contact or through biting of insects.

Another illustration of the value of the preventive principle is the virtual abolition of lockjaw, or tetanus, through the prophylactic or preventive injection of tetanus antitoxin in the case of dirty wounds. I might here point out a difference between the two antitoxins, that of diphtheria and that of lockjaw. The former, with its modifications, prevents as well as cures diphtheria; tetanus antitoxin, on the other hand, while it has most valuable preventive powers, is but feebly curative. Hence the importance of injecting it before the dreaded disease develops. There is, furthermore, an enormous difference in the cost of the two proceedings: protective inoculation against lockjaw costs about 65 cents, while the cost of antitoxin to cure may run up to very large figures. In the Philadelphia General Hospital, a charitable institution where treatment is entirely free, a recent case of tetanus cost the hospital $150 for antitoxin; I myself had a patient once in the same institution who recovered after receiving $99 worth of antitoxin. Only for the indigent and for the rich is such costly treatment available, and it can usually be avoided by an outlay of 65 cents. I want to make it plain that tetanus antitoxin is wholly unnecessary when there is no wound.[4]

[4] Recently attempts have been made to immunize healthy children against tetanus by antitoxin injections. As tetanus is a rare disease at best, the method will need many trials before a definite conclusion can be reached.

The principle of prevention by antitoxins, vaccines, or similar products of the laboratory is constantly being widened in its application. In scarlet fever, measles, and whooping cough the attempt is made to protect children by injections. In measles striking results have been obtained with blood serum from adults who had passed through an attack of measles in childhood, which applies to nearly all grown persons. Unfortunately for the comfort and happiness of millions of people, the preventive principle has not yet succeeded in combating the common cold with any gratifying measure of success. Scientists are constantly at work to find an effective method against an ailment, minor in its manifestations but major in what it does to the school child, to the factory worker, to persons in all walks of life. We are still in the position of the witty Frenchman who said that he had had eight head colds in a month and had cured them all but the first one.

A disease formerly very prevalent and highly fatal in the Southern states is pellagra. Better acquaintance with it has shown that it is more common in the Northern states than was formerly believed. In Europe it prevails in Italy, Spain, in the Balkans and Turkey; in Asia it is found in India, China, and Japan; it is not rare in Mexico and the West Indies. Its name is derived from *pella*, skin, and *agra*, rough, indicating that an abnormal condition of the skin is one of its symptoms. Other more serious symptoms are disturbances of the digestive tract and mental deterioration. As early as 1735 Casal ascribed the disease to faulty nutrition. Funk in 1902 suggested a vitamin deficiency as the cause. Finally, Goldberger of the United States Public Health Service, by a study of the diets of inmates in asylums who were pellagrins, that is pellagra sufferers, came to the conclusion that the disease was of dietetic

origin and due to a deficiency of animal proteins. Further observations narrowed the responsible factors down to vitamin lack, the particular vitamin being B2, also called pellagra-preventive (P.P.) vitamin. By means of foods rich in the B2 vitamin—now chemically identified as nicotinic acid—it is possible to prevent pellagra. Such foods are milk, red meat, and brewers' yeast. In order to achieve the abolition of pellagra in this country education and a better social economy are necessary.

Another disease indigenous in the Southern states and in the Caribbean Islands is infestation with the hook worm, the ankylostoma. Hook worm disease is responsible for much of the undernutrition, the anemia, and the lassitude in some of the "poor whites" and Negroes of the South. In Porto Rico before the introduction of preventive measures by Ashford, nearly 100 per cent of the natives were infested with the parasite, which is a tiny slender worm from one-half to three-quarters inch in length.

Although parasitic in the bowel, the worm does not gain entrance through the mouth, but through the skin whence it gradually migrates to its permanent habitat in the intestines. It attaches itself to the mucous membrane and sucks blood. Because the people in warm countries go barefooted, they expose themselves to the penetration of the larvæ of the worm which exist wherever in those countries human offal is deposited. Since these facts have become known the eradication of the disease has made great headway.

It is not without interest that historically hook worm disease is one of the most ancient of diseases. It has prevailed in Egypt since earliest days and is alluded to in the Ebers papyrus. During the building of the St.

Gothard tunnel in Switzerland it became a serious disease among the tunnel workers.

The latest step in the field of preventive medicine—and one of the most important—is the campaign against syphilis. Syphilis differs from the majority of infectious diseases in that it is a chronic affection, often latent for many years during which the infected individual is unaware of his danger and is capable of transmitting the disease. It is responsible for more miscarriages and still-births than all other diseases put together. The late conditions are often of the most devastating kind—locomotor ataxia, general paralysis of the insane, disease of the heart and blood vessels. In the chronic nervous wards of our hospitals and in the asylums for the insane it looms large as a feeder of those institutions. It is held responsible for more than 10 per cent of all insanity and 7 per cent of all diseases of the heart and blood vessels. Moreover, syphilis has a far greater tendency to affect the offspring than any other disease. At present six and a half million men, women and children are judged to be infected with syphilis in the United States, and 578,000 new cases are said to occur every year. If smallpox affected only one-tenth as many the country would be in a fever of excitement and citizens would move heaven and earth to check the disease. All in all, the campaign so courageously inaugurated recently by Surgeon-General Parran deserves universal support. Had we not been so long under the influence of Victorian or Puritan prudery, the work in which the profession is now engaged would have had an earlier start.

A preventive method of a different category from those I have been considering is the use of iodine in the prevention as well as treatment of goiter. Although the element iodine was not discovered until 1812, the

Chinese nearly 4,000 years ago used it in the form of ashes of seaweed in goiter. In Europe, since the sixth century, perhaps earlier, the ashes of seaweed and sponge were employed for the same purpose. As a prophylactic agent against the development of goiter iodine or iodinized salt began to be employed extensively within the past quarter century, mainly in those regions of this country where goiter is more or less endemic, as in the Great Lakes basin. There can be no doubt of the efficacy of this treatment if it is begun in childhood.[5]

But extensive as is the field of preventive medicine I have sketched, it reaches only a part of the ills and troubles that flesh is heir to. Many diseased conditions are less obvious and may exist for months or years without producing symptoms of which the patient is clearly aware. From the point of view of individual health, these conditions are far more important than the infectious diseases I have named. They are more common, affect an enormous proportion of the population, and are more diversified. But though common and though multitudinous, they all, or nearly all, come within the range of preventive medicine. In order to discover them, they must be looked for since, unlike the infectious diseases mentioned, they usually do not obtrude themselves by dramatic symptoms.

The fact that there are ever so many diseases that

[5] When goiter becomes large or when it produces severe toxic symptoms, it can no longer be cured by iodine. Surgery then steps in and achieves some of its most brilliant successes. There is a record of seventy such operations before the year 1850 and for a whole generation after that the number of operations remained small. Beginning with the middle eighties thyroidectomy, the operation of the removal of the thyroid gland, was done in ever increasing numbers. Charles H. Mayo of the Mayo Clinic, who performed his first goiter operation in 1889, completed his five thousandth in 1918. Next to the operation for appendicitis and gallstone, it is the most common major operation in this country.

must be looked for has led medical men since the beginning of this century, more earnestly since the late war, to advocate periodic health examinations. The war, which did so little good, has one thing to its credit —it showed the unexpected prevalence of defects in the draftees, causing the rejection of fully one-third of young men in the best years as unfit for military service, and thereby focussed the attention of the medical profession on the need and wisdom of health examinations. I need not elaborate this subject, which is almost self-evident. But the practice, even among physicians themselves, is more honored in the breach than the observance. Nearly all diseases except the acute infections have slight beginnings and are curable or at least arrestible at that stage. A small fire may easily be put out; if not detected, the house may burn down. I was once motoring in the neighborhood of St. Andrews in New Brunswick, Canada, when suddenly the automobile made an unaccustomed noise. The chauffeur thought it was of no moment—a judgment I had to accept for I knew nothing about the heart and lungs of an automobile. We went a little farther, there was a loud crack, and the car stopped. We had to have it towed; the differential was found broken; there was none available, we were obliged to go to our summer home by train, and only after days and great expense did the car come back to us. We were assured that a large part of the damage could have been avoided had the car been examined when the first noise was heard.

The human body is infinitely more complicated than an automobile, and what is more important and accentuates the difference between the two machines, there are, as has been often remarked, no spare parts for the human machine. What is the moral of this? It

is that the human body should be occasionally, perhaps regularly, inspected to discover latent defects which, if neglected, may lead to the cracking of a cylinder—in other words, to prolonged and costly ill-health. These examinations should not be confined to the adult man or woman; they should be given to our children as well. It is surprising how many remediable defects such an examination in children may reveal. This is well known to physicians and nurses in the public schools, in those in which the practice of health examinations is in vogue. In Pennsylvania, during the depression with its fearful unemployment, a commission arranged for examinations in many of the counties of the state by altruistic physicians. The defects discovered among the children of the poor amazed those conversant with the results.

Regarding adults, I might cite the experience of Doctor Richard C. Cabot who with four other physicians examined one hundred "healthy" men from the working classes. Of these men, sixty-four were advised to go to their family physicians for treatment for various abnormal conditions. One had early glaucoma, a serious eye disease which if not dealt with leads to blindness, one had beginning tuberculosis, two had valvular heart disease, eighteen had obviously high blood pressure. Yet all had considered themselves as normal, healthy human beings.

Many colleges and universities now consider it their duty to make examinations of all entering freshmen, a work for which expensive health services are maintained. In some institutions these examinations are repeated annually, while those students in whom defects are found receive advice and are kept under observation. This is a splendid phase of preventive medicine. One of the striking discoveries has been that

failure in work or in passing examinations is not always due to inferior intellect, but quite frequently to faulty adjustment to college life. This rather startling fact was brought out by adding to the physical a psychological examination. Such an examination, which aims to explore the human personality in large masses of individuals, is comparatively new. It was begun as a systematic procedure during the war and gave most interesting results. Unfortunately, under the pressure of military requirements, it was but rarely possible to make the needed readjustments. It can be done more easily in civilian life; the finding of the maladjustment is often tantamount to removing it.

The importance of the health examination may be appreciated when I detail a few findings in students of the University of Pennsylvania supplied to me by Doctor Stanley E. Harris. From the standpoint of preventive medicine periodic health examinations at the University of Pennsylvania have been of special value in the detection of early (pre-symptomatic) tuberculosis, cardiovascular disease, and of unhealthy mental states. Tuberculin tests (Mantoux) in entering freshmen have been positive in 50 per cent during the past several years. X-ray studies carried out on all positive reactors—470 in 1935-36 and 303 in 1936-37—have revealed active tuberculosis in three cases or .6 per cent in 1935-36.

Among medical students, however, the percentage of positive reactors is much higher, being 78.8 per cent in 1935-36 and 84.3 per cent in 1936-37 in the first year class; 90 per cent in 1935-36 and 92.7 per cent in 1936-37 in the second year class; 97.4 per cent in 1935-36 and 95.3 per cent in 1936-37 in the third year class, and 97.5 per cent in 1935-36 and 98.9 per cent in 1936-37 in the fourth year class. The number of

cases of active tuberculosis found among medical students through periodic X-ray studies is also much higher among the students reacting positively to tuberculin than in the students of the undergraduate and of the law schools. Three cases were found among one hundred fifty students in the School of Education and none in one hundred sixty-five law students. Among medical students the incidence in the years 1935-36 and 1936-37, respectively, was none and one in the first year class; one and none in the second year class; eleven and eight in the third year class and eighteen and eleven in the fourth year class.

During four years careful cardiac studies, including electrocardiograms and orthodiagrams, were carried out in every case where murmurs, hypertension, or other cardiovascular abnormalities were noted. In 74 per cent the evidence was insufficient for a diagnosis of cardiovascular disease to be made. In the remainder, many cases of heart disease and marked hypertension were found in students who had no previous knowledge of their condition.

The questionnaires filled out by the students entering the University in 1936 were studied from the psychiatric standpoint and 1,050 (64.9 per cent) of the 1,619 were found to show evidence of some degree of emotional maladjustment. Most of these students were interviewed—224 in the first semester since they seemed to be in urgent need of psychiatric help. Of those interviewed fourteen continued to consult the psychiatrist voluntarily, seeking help for the solution of their problems.

Many less important conditions have been revealed by the examinations and prompt treatment or correction has probably prevented later disability. Among

these may be mentioned carious or infected teeth, refractive errors, diseased tonsils, hernias, varicocele, ringworm, albuminuria, glycosuria, obesity and subnutrition.

We are warranted in concluding from the abnormal conditions uncovered by the health examination in a group of supposedly healthy young men and women that a similar examination in older persons would reveal a still larger proportion of not entirely healthy individuals, would show the same physical abnormalities found in university students, but in a more advanced stage.

Sir William Osler used to speak of a little albumin in the urine as a "redlight signal"; if the engineer heeds such a signal, it matters not whether there is a fallen bridge or another train on the same track, he is safe. And so to a large extent with the human being in whom some defect is found—if he looks upon it as a redlight signal and shapes his life accordingly, it may even contribute to his longevity, since it makes him more careful and circumspect. Early in my medical career a man of forty-nine years came to me much chagrined and disturbed because he had been denied life insurance on account of the presence of a little albumin in his urine. He resented the additional fact that a chum of his, apparently in no better health, had been accepted. This friend lived only a few years, while the rejected applicant living a careful life died well up in the seventies of angina pectoris. I doubt whether he would have lived to that age had he not known and heeded the redlight signal.

It seems to me that the utility of periodic health examinations cannot be disputed.

The question—can the family doctor make the modern health examination—is a pertinent one. My

answer is in the affirmative. The man, or woman, now graduated from our medical schools, with the subsequent training in hospital, is capable of making a complete health examination. Naturally, if he finds some defect requiring treatment or advice from a specialist, he will refer the patient to the proper authority. But he should be the judge what particular specialist, in the generic sense, the person examined should consult. However, only a small proportion of supposedly healthy individuals will need a specialist—in the vast majority the family doctor can handle the situation, aided most often perhaps by the dentist.

The kind of health examination I have in mind requires time and skill, hence it must be paid for. If I have made my point clear, it is evident that those who can afford it cannot make a better investment of their money than by paying the doctor for such service. If they get what is called a clean bill of health, the doctor ought to be cheerfully paid. Yet so perverse is human nature that quite a number of persons are more irked by paying the fee when they are told they are normal than when the doctor reports the finding of one or more defects. They think their money was wasted.

The question how the poor and the lower middle classes are to pay for the service opens up the great problem of medical sociology which I shall discuss in another chapter.

The health examination I have so far spoken of has for its objective the discovery as well as the elimination of removable defects. But there are other health examinations that have a somewhat different purpose—among them is that made in industry. Nearly all large industrial corporations, whether productive or dis-

tributive, subject every applicant for a job to a physical examination for the purpose of eliminating the unfit, those who could not be expected to do the required work for any length of time or who might become a financial liability to the employer. Although no attempt is here made to correct defects, the examination being for employer and not for employee protection, some good comes out of it if the examining doctor informs the rejected applicant of his findings. In some industrial health organizations the employee receives an examination at regular intervals, a laudable example of preventive medicine that should be widely followed.

One of the most important industrial diseases is silicosis, a serious affection of the lungs due to the inhalation in mining, blasting or roadmaking of dust laden with silica or quartz. Self-interest as well as ordinary decency have obliged the employer to find means of preventing such a devastating illness, and much has been accomplished. Many of the states have laws protecting the worker engaged in a hazardous trade by demanding protective devices. At the same time the corporations of their own accord usually make periodic health examinations of their employees to detect the earliest signs of harmful effects. Had the companies engaged in making radium watches had such a system of health examinations, the pathetic suffering and inevitable death of a large number of workers would have been avoided.

Another type of health examination, also on a nonprotective basis, is that made by life insurance companies. How often do men with supreme confidence in their physical integrity submit to such examinations

only to find that they are either not acceptable or acceptable only at higher rates than their age warrants. In the nature of things, such examinations are limited to a small fraction of the total population; moreover, they are generally made but once, although a few companies repeat them annually. Furthermore, as insurance companies concern themselves as a rule only with the question of the patient as an insurance risk, their examiners rarely take into account defects that do not shorten life, but which may nevertheless be important for comfort or for the earning capacity of the individual; such as eye defects, defects of posture, flat feet, skin rashes, infected teeth, bad dietetic or other harmful habits.

While the idea of health examinations must impress an intelligent person as theoretically excellent, it has in practice been found very difficult to make people arrange for them. This inertia is in part due to lack of the requisite knowledge, in part to the expense, in part to that very human habit not confined to countries where *mañana* is a popular word—to procrastination.

There are organizations that make health examinations for a fixed fee; they are good in their way; they advise the client to see his family doctor to have the faults found corrected. But there is an advantage in going directly to the family doctor for he, having a personal interest in the patient, will see to it, as far as he can, that the quasi-patient follows his advice. Moreover, words that on paper, on the report of some life extension company, look ominous to the patient, when used by the family doctor may lose their terror. There is, after all, a difference between a personal and an impersonal interest.

Education is the keynote—it must be done by all available, legitimate means. No one, of course, is in a better position than the doctor, whether he is a general practitioner or a specialist. Just as every physician from mere habit recommends vaccination in childhood and revaccination whenever there is a smallpox scare, so he can and should recommend periodic health examinations. Some have suggested that the doctor imitate the wise and time-honored practice of dentists of sending cards to his patients asking them to make appointments for their regular "once-over." Up to now doctors have hesitated to break with the age-old custom of having the patient take the initiative; perhaps the time is ripe for a change to the dentist's plan.

Newspapers and magazines can be of enormous help. The newspapers, it is true, are frequently guilty of distorting medical items, not because of any sinister motives but because of ignorance regarding the particular medical topic featured. The evil is diminishing and will largely disappear as soon as editors make it a rule to seek competent advice from the leaders of the profession before printing medical news.

I am very much pleased with the advertising methods of the Metropolitan Life Insurance Company which again and again sounds the slogan "Consult Your Doctor"; "Give Your Heart a Chance." *Hygeia*, a monthly magazine published by the American Medical Association, is also a valuable agent both for popularizing useful medical knowledge and for promoting the principles of preventive medicine. School teachers who are daily made aware wherever there is school medical inspection of the great prevalence of unknown minor and even major defects, are in a key position to make propaganda for regular health examinations not only for the children but also for the children's parents.

Perhaps in a generation, perhaps in two generations, people in this country will accustom themselves to a periodic health examination and will place the cost in their budget as they budget fire and life insurance, than both of which it is more valuable, for it protects against a bodily fire and prolongs life, while insurance does neither—it does not protect against sickness or against fire.

CHAPTER THIRTEEN

LEISURE AND HEALTH

One of the conditions that will make for better health in middle life and for greater longevity is the cultivation of leisure. The continual hard struggle of the early settlers, the pushing westward of the frontier, the gold rush, the land rush, the oil rush, had imbued our people with a spirit of restlessness that persists even though it is directed into other channels—in the struggle for money, for success, for power and position. For that struggle, whether successful or unsuccessful, we pay a heavy price, made evident in the mounting death rate from heart disease in the decades from fifty to sixty and sixty to seventy. But that is not the only penalty. Others are the nervous breakdowns, the digestive disorders so common in middle life. The strenuous life so lauded and idealized two or three decades ago does not make for longevity as many historic examples demonstrate.[1]

It may seem that I have floundered far afield from the thing I started out with, namely leisure, but it only seems so. In reality leisure is the counterfoil for the conditions I have described. If we were to cultivate leisure, a spirit of serenity, the machinery would get a chance to rest. It might be said that men of action—

[1] Stanley Baldwin, now Lord Baldwin, put it well when he said: "Success is not necessarily a matter to which you should devote your whole life."

captains of industry, statesmen, busy professional men —often take long vacations. That is true, but many in their vacations are just as strenuous only in another way, in sport, as they were in their occupations. Many are on the golf links almost the moment they arrive at their vacation homes, play vigorously a good part of the day and sit for long hours at bridge at night. That is not leisure. Leisure is more mental than physical. It cannot thrive properly when one is driven by a constant desire to be doing something, especially when that doing something involves competition with others. That is why fishing, despite its crucial moments, is the most restful sport, unless it involves wading in cold streams for the elusive trout or salmon.

In former ages men imbued with a deep religious feeling often sought leisure and peace of mind in the *vita contemplativa*. Today the Roman Church fosters this method to some degree, by its retreats. Such periods of tranquillity by letting the machinery run at a lower level have much to recommend them. They are, however, entirely impracticable as a mass solution of the leisure problem. The kind of leisure I have in mind is rather a mental attitude or attribute than a particular mode of physical or mental rest.

Thus the leisure that I believe we should cultivate is a philosophical leisure. We must learn how wisely to lose time. Lin Yutang, that brilliant Anglicized Chinaman who is one of the best of English prose writers, has described the Chinese attitude toward leisure: "Leisure in time," he says, "is like unoccupied floor space in a room. It creates a sense of comfort. Culture is essentially a product of leisure. The art of culture is the art of loafing. Time is useful in proportion to the time it is not being used." This oriental Taoistic conception of leisure is not confined to the possessing classes in

China who might be able to afford it, it is universal among rich and poor. However, the Chinese model will never be adopted by Americans. It is one field in which the east and west can never meet, but we might strive for a type of leisure suited to our temperament. The world is ready for leisure, eager for it, and it has time for it. No recent writer has more clearly pointed this out than Maury Maverick in his Cellinesque autobiography.

Under the new labor legislation prevailing in the three great democracies the working day of the worker has been greatly shortened. He now has the equivalent of two days' rest in seven. The employer himself will benefit by this curtailment of the working week. How can the idle time be utilized to the best advantage for the two great objects, culture and health? For the European the problem is less difficult because he never was a restless "go-getter" like the American and has known from time immemorial how to get the best out of his leisure hours. The Englishman closes his shop for lunch and takes his afternoon tea. The Frenchman has also one or two hours at midday and takes three-quarters of an hour to sip his tiny cup of coffee or his glass of orange juice. The Germans did the same thing, only substituting beer, until the new régime infused a spirit of restless, peaceless driving into labor not unlike that in our great factories that are the seat of mass production on a gigantic scale.

The problem how to educate the average American in the use of his newly found leisure is not an easy one. It requires thoughtful, long-range planning, in which the family must be envisaged as a unit. I know of few things more worth while than such an undertaking. Olga Samaroff Stokowski is doing something for adult education in music and other individuals as well as

organizations are trying to find practicable methods in other fields. It will take the best minds in the country to develop a system for the American people and it must not be done too leisurely—this may seem like a contradiction—otherwise undesirable habits of spending the free time will be developed which it may be difficult to eradicate. Indeed, some have already been developed.

CHAPTER FOURTEEN

THE SOCIAL OUTLOOK IN MEDICINE

Like slavery, like the protective tariff, like prohibition of bygone days, so in our time the socialization of medicine has become a bitterly fought issue, although its discussion has not engulfed nearly as many people as the other forgotten questions. Those it touches it has split into two snarling camps that are not above somewhat undignified recriminations. What is the fight about, and who are the participants? The fight centers on the best method of providing good medical care for all the people, and the participants are, on the one side, the medical organizations, on the other socially-minded, chiefly lay, persons, with a fair proportion of doctors, probably larger than is suspected.

The first question that will need to be answered is what constitutes good or adequate medical care. It is not easy to give a precise definition, for good medical care is a changing commodity, differing today from what it was twenty years ago and from what it will be twenty years hence. Throughout history, the best medical care was and even today is largely curative medicine, treating the ill with the best means available at the time. Medicine did not concern itself in any significant way with the other function rightly belonging to it, namely, the preventing of disease, or the conserv-

ing of health. Because curative medicine deals with the sick individual, the doctor himself became an individualist, content to look after his own patients, while other doctors looked after theirs. Those not actually ill, comprising by far the largest part of the population, did not interest him, although they had the potentialities of illness if not the actualities. Gradually, sometimes with, oftener without his opposition, government entered into the medical field on the side of the people as a whole and undertook massive health protection, as by the purification of the water supply, pasteurization of milk, inspection of food, vaccination against smallpox and against diphtheria, mental hygiene, care of the tuberculous—all fields in which the doctor as an individual was nearly powerless. The results achieved by these sanitary measures in the saving of human lives and of money are altogether beyond computation. But so are the achievements of curative medicine, for the doctor as an individual practitioner has performed his function in a way that on the whole justifies but little criticism.

To come back to a definition of adequate or good medical care: I would say that it is that type of medicine practised by the best-trained men in the profession in private work, in hospitals, and in medical groups. Now, such care is not available to all the people, perhaps not to the majority. Upon this all elements are agreed, but not upon the causes. The social economists are of the opinion that one of the main reasons why good medical care is not universally available is its cost. I am quite prepared to admit that good medical care is too expensive for the pocketbook of the majority of the people, but if it is stated baldly in this way it might convey the impression that the high cost was due to the doctor's charges. The cost is

high for a different reason; for the reason that the study of a patient's case as well as the treatment by modern methods involves not only the entrance into the field of numerous specialists but also the application of many laboratory investigations—blood, urine, heart, X-ray, basal metabolism, bacteriologic studies, perhaps even animal inoculations. Many persons today when they consult their doctors demand such a comprehensive study. I once had a patient, a woman of means, who asked me to examine her. She said, "Doctor, I want the whole works"!

When the cost of the various tests is added to the family doctor's or the surgeon's fee, to the fee of the various specialists, the nurse's salary, the hospital charges (which include the very expensive X-ray studies), the sum reached may be staggering, far beyond the budget capacity of three-fourths of the American people. Yet in the whole list no one of the medical personnel receives a very large compensation except, perhaps, the surgeon, and as far as he is concerned, he operates ten times as often for nothing as for pay. I would not deny that occasionally men in the medical profession overcharge, but that cannot be considered the basis of the high cost of medical care. Under the present individualistic system of medical practice the high cost for a thorough examination is unavoidable, but the service rendered is worth what it costs.

It goes without saying that the poor are as much entitled to good medical care as the rich. Although unable to pay for it, it is as much their right as a public school education and police and fire protection. In fact, health protection is more important than all the others. One cannot say, however, that it is the duty of the medical profession to provide it; rather is it the

duty of society to make it possible for the medical profession to provide good medical care for all the people. Under present conditions the vast majority of the poor, the economically underprivileged, are not getting the medical care which they need and which, with a wiser ordering of human affairs, they would receive. Those of us who live in sizable cities are inclined to think that the large number of hospitals and clinics, often too large in number by reason of sectarianism and private ambition, afford ample facilities for providing good medical care at little or no cost. Every doctor knows that there are hundreds of persons living within a stone's throw of a hospital who are woefully lacking in the medical care they need. And if the needy do make use of the free facilities, it is for cure and not for prevention. Unfamiliarity with the available opportunities and ignorance of the dangers of neglect as well as prejudice against hospitals keep large sections of the poorer classes, particularly the foreign born, away from public institutions. Education through vernacular newspapers, through church and school—the teachers not limiting themselves to the children but also instructing the parents—will do much to remove these obstacles.

But the poor in the cities are not the only poor throughout the land; in many rural as well as in industrial communities there are thousands of persons who urgently need good medical care and cannot obtain it. This situation is graphically portrayed by Maury Maverick in his autobiography. Many areas in the so-called backward states, but also numerous sections in New England, are not adequately supplied with doctors. How can one expect in this age that a man who spent eight, nine or ten years in preparation for his medical degree will go into an impoverished,

frequently degraded community to practise medicine for an income that will scarcely reach the subsistence level. An insufficiency of doctors is, as a rule, associated with an insufficiency of hospital facilities. Miss Esther Everett Lape in an article in the *Atlantic Monthly* for April, 1937, quotes from a correspondent, a member of the public health service of a western state, the following:

"In this state approximately one-third of the people die without consulting a doctor even in their fatal illness. The death certificate says 'no medical attendant' and cause of death is 'unknown.' In six of its thirty-one counties, less than one-quarter of the mothers have medical care in childbirth. In seven of this state's counties more than three-quarters of the babies that die have had no medical care.

"No one has ever tried to calculate what it would cost to provide adequate medical care for these thousands that receive no medical care at all. But there are a few considerations which suggest that the cost is far beyond this state's ability to pay.

"Many of our families live twenty miles or more from the nearest physician. Under the present system, the doctor charges one dollar per mile for country calls. It is possible that a socialized system could be devised which would reduce the cost of calls into the country, but under any system each call would mean many dollars. And today adequate care means several calls. Twenty years ago the doctor might call once and pronounce pneumonia, and that single visit might be considered adequate enough. But today the sputum must be 'typed,' the appropriate serum selected and administered. Perhaps the next day more serum will be required. Oxygen may be needed, and a skilled attendant to administer the oxygen. To provide such

service at twenty miles from our base will cost, under any system, well into three figures. . . .

"A conservative estimate from a health survey of this state made two years ago places the number of cases of active tuberculosis at not less than 15,000. At present there are no free beds for tuberculosis and very few of these patients can pay for sanatorium care. There is no provision for surgical treatment to save the patient's life and stop the spread of infection. The same survey proves that there are in the state 20,000 people whose blood shows the presence of syphilis, yet only one thousand are under the care of a physician.

"The infant mortality in this state is the highest in the union. It was 126.1 per 1,000 live births in 1935.

"It is clear that the bill for adequate care will be a large one. What resources has this state to meet such a bill?"

The situation in these places, which can be duplicated many times, cries urgently for relief. But better medical care and more doctors is only part of the answer. The conditions creating poverty, degeneration, inertia, hopelessness, the existence of which is a powerful indictment against our boasted civilization, must be removed. The task is not simple; for many states it is too big and can only be solved, if it is at all solvable, by the entrance into the picture of the Federal government.

It is not my intention to discuss the economic approach to this problem, but I cannot refrain from mentioning resettlement, soil conservation, cheap water, cheap electric power, agricultural administration, minimum hours of work, a minimum wage, abolition of child labor, removal of industrial hazards, and above all, education as factors that are ultimately of far greater importance in conserving the health of

the people than vaccination or any other available medical procedure.

I have so far spoken only of the poor and their need for better, I might say simply for medical care. What about the rich? High cost is no bar where money is available. And yet, even the well-to-do sometimes fail in getting good medical care, for a variety of reasons. Ignorance is one; ignorance combined with gullibility. Such persons readily fall a prey to quacks and cults and isms. There are persons, otherwise intelligent, who are opposed to vaccination, to antitoxins, even to surgical operations on principle. With such it is difficult to argue. As Goethe said, "against stupidity even the Gods fight in vain."

Now between the poor on the one side and the well-to-do on the other, is a large middle section for which adequate medical care in all it implies is a heavy, usually an impossible burden. The members of this group, often called the white-collar class, do not want charity; hence they will not, except in the last extremity, enter the doors open to the poor. Every physician has seen innumerable illustrations of the pathetic dilemma to which these self-respecting citizens are exposed in serious illness. They have to go into debt which it may take them years to discharge, perhaps affecting the health, education, and number of their children. Have we, a rich nation, the right social philosophy if such things can happen?

All must admit that it is the duty of the government to establish social conditions that protect the individual against dangers arising in his participation in the social life, protect him in his work, in his coming and going, and in his contact with others, protect him not only against disease but against those conditions, economic and otherwise, that tend to impair mental and physical

health and thus favor disease. In one direction the state has recognized its responsibility. Realizing that treatment of disease can be carried out only by properly prepared persons, it has determined by law what shall constitute proper preparation, and it withholds its license to treat the sick from those that fail to show such preparation.

In this country, during the period of expansion and the accumulation of wealth, little thought was given to the subject of medical care for all the people until the period of the World War, and then not intensively, except in the army and the navy. The great depression with its concomitants of unemployment, undernutrition, ill health, forced the subject upon thoughtful people. A thorough study was therefore begun by a committee, known as the Committee on the Costs of Medical Care, under the chairmanship of Dr. Ray Lyman Wilbur, at the time Secretary of the Interior in President Hoover's Cabinet. The work of the Committee, which was composed of able and conscientious men, both medical and lay, culminated in two divergent reports, known as the Majority and the Minority Reports. In a general way the Majority Report attempts to solve both the costs and distribution of adequate medical care by a process of socialization of medicine, while the Minority Report upholds the traditional, individualistic, mainly curative practice of medicine. These two ideologies have been in verbal conflict ever since the reports appeared, their protagonists, as I have intimated, are accusing each other of improper and unworthy motives. The group favoring a radical departure from medical individualism is made up mainly of economists, representatives of eleemosynary institutions, especially certain foundations, and among physicians, a fairly large but un-

organized group.[1] Contending more or less for the status quo are the local, state and national medical organizations.

The largest medical organization in this country—and in the world—is the American Medical Association (A.M.A.), of the achievements of which any physician, yes any citizen, may well be proud. It has eliminated most of the inferior medical schools and in that and in other ways has raised the level of medical education in this country above what it is anywhere else except perhaps in the Scandinavian countries. The annual meetings of the Association with their scientific exhibits are wonderfully well attended and serve a valuable educational purpose. The Association furthermore examines our drugs and proprietary foods in an impartial manner—its reports are implicitly accepted by the entire medical profession. It engages in a number of other worthwhile activities, none more important than the publication of the weekly *Journal* of the American Medical Association. As a medical publication for the practitioner of medicine, this *Journal* under the able editorship of Dr. Morris Fishbein, has become the leading medical publication in the entire world. It is in truth a phenomenon, the envy and admiration of physicians in other lands. Its influence is incalculable and by that token it is of the greatest importance that it shall be on the right side of vital questions concerning the profession and the public, and to be on the right side may sometimes mean going to the left.

I might say that a socialized system of medicine has for some time been in vogue in a number of European countries. Germany was the first to apply it on a large

[1] Since this was written this group has formed a loose organization, in the beginning of 430 members, now nearly a thousand.

scale. France and the Scandinavian countries have it and also Great Britain, where it was introduced by David Lloyd George in 1911, although medical benefits did not actually begin until 1913. It is difficult to get an unbiased opinion from these countries upon which to base a conclusion as to whether their system of socialized medicine is satisfactory. However, information that I have from some of the leaders of the British medical profession is to the effect that the public is, on the whole, satisfied, and that there is even a desire on the part of higher income groups to get the benefits of "panel medicine."[2] As far as the physicians are concerned, it is rather interesting that although they fought the act bitterly when it was first introduced in Parliament, they are sufficiently satisfied with its workings that they do not want to go back to the old system of individualism with its uncertain income.[3]

[2] That the panel system is not deterring young men and women from studying medicine is indicated by the growing percentage of medical students in British universities. While the percentage in 1932-33 was 22.4, in 1936-37 it was 26.7. This notable increase is to some extent due to the greater demand for British trained medical men overseas.

[3] An interesting experiment in preventive and curative medicine has been made in a small community in London. In April, 1926, a company of private individuals established the Pioneer Health Center in a house in Peckham, London (Biologists in Search of Material. London 1938, quoted from *Nature*, vol. 142, July 23, 1938, p. 134). It was situated in the middle of a densely populated artisan district, and staffed with a resident medical officer, a social secretary and a housekeeper. Families living in the neighborhood were invited to join a "family club" for a small weekly sum, in return for which they were offered a periodic medical and dental overhaul for each individual, a parents' clinic with men and women doctors, antenatal, postnatal and infant welfare clinics, and to these were added an orthopedic clinic and a children's afternoon nursery. The service offered to each family was advisory. No disease received treatment at the Center. Its objects were inquiry, social and medical investigation, to evoke a desire for health, to detect and direct attention to the beginnings of disease, and to give advice as to how to procure necessary and effective treatment.

The Peckham Health Center has excellently demonstrated the great principle of the importance of seeing and knowing the family, both in diagnosing disease and in teaching the individual the way of health, and still more in detecting disease which is minor or unsuspected. One of the strong points, in-

Australia is on the point of solving the vexed problem of medical care for its people. An act providing for national health and pension insurance is expected to be put in operation by January 1, 1939. The act provides for a basic allowance to doctors and extra fees for anesthesia, major operations, rœntgenograms, pathological examinations, treatment of venereal disease, and treatment of mishaps consequent on pregnancy. The government expects to appoint between twenty-five and thirty doctors to supervise the operation of the medical service under the act. They will be selected from the ranks of general practitioners and will be salaried officers of the Commonwealth government. One fact that should interest our American medical men is that insurance companies have been excluded from the list of approved societies to administer the medical benefit sections of the scheme.

Benefits to which the insured persons are entitled under the plan are medical treatment, including certain medical and surgical appliances, sickness benefits for men, women and dependents, disability benefits, old age pensions, together with medical attention and treatment, widows' pensions for life or until remarriage, and orphans' pensions.

To secure these benefits workers earning less than £365 or $1,825 a year are required to pay one shilling and six pence or thirty-seven cents, and female workers

deed the primary purpose, of the Center, is the promotion of personal hygiene, its assessment and indications, and the increase in length of life, in capacity, and in well-being and happiness which may result from it. An interesting discovery was the presence of malnutrition despite the absence of food shortage and despite contact with good and cheap markets, which shows that the problem of nutrition cannot be solved by confining ourselves to food quantity and quality. Apparently iron and calcium deficiencies, various febrile states and ineffectual assimilation of food are responsible for much of the poor nutrition. Adequate means is no protection against malnutrition—its cause is inadequate utilization by the body of the food consumed.

one shilling or twenty-five cents a week. Each compulsory contribution will be matched by an equal contribution by the employer. Insured men may voluntarily insure for the extension of medical benefits for their wives and children. This will cost six pence a week and the government will contribute five shillings a head annually for every married contributor. The service is also to include preventive medicine which is not generally or not definitely a part of traditional medical practice.

Let us now see what our American social scientists propose as a basic system of medicine by means of which good medical care shall have a wider distribution in this country. They would first of all expand public health services. I have already referred to some of the activities of the health authorities. Leaving out the merely sanitary activities, we have tuberculosis control, care of the insane and epileptic, mental hygiene departments, campaigns against venereal diseases and against diphtheria and scarlet fever. Efforts are now in contemplation to invest with a public interest other diseases, such as cancer, pneumonia, arthritis, rheumatic fever, and heart disease. Many of these and other activities for which the physicians as individuals have not the time, the money or the authority, must be undertaken by local and state authorities, but considering the meager or exhausted budgets of some states, the Federal government will have to give help.

Another step in the program is tax support for hospitals. This feature of the program is based on the recognition of the fact that the hospital is the center of medical practice and medical education, and as such cannot, or ought not to be, dependent on private philanthropy for its sole support. Tax funds would be

allocated on the basis of the amount of service rendered by the hospital and its physicians to the indigent and low income group, whether in the hospital wards or in the dispensary. To a certain extent such a system prevails in Pennsylvania, where private non-sectarian hospitals receive state aid in accordance with the amount of free service rendered by them. In addition, the state supports a large number of hospitals, both general and special, entirely with its own funds.

A third proposal springs from the recognition of the principle that the medical care of the underprivileged, like health and fire protection, is a logical charge on tax funds, which, as in the case of an expanding public health program, must first of all come from local and state sources, and when these are inadequate, from grants-in-aid by the Federal government. For the doctor, this is perhaps the most important suggestion. He gives, and always has given, an enormous amount of free service in hospital, in dispensary, in his office, and in patients' homes.

I have spoken above of the scarcity of doctors in certain communities. It has been shown that when the present practitioner dies or moves away from such a community, it is almost impossible to have a well-trained physician take his place. This is the reason why vast areas in this country are totally undermanned medically. If good doctors are to locate in such regions, they must be assured of a reasonable income which can be derived only from public funds. Moreover, they must be provided with hospital facilities, without which the well-trained doctors of today do not care to practise. [4]

[4] In some communities, the citizens have banded together and have provided for the education of a local youth as doctor on his pledge to practise among them for a contractual period.

The foregoing proposals, are neither fantastic nor revolutionary.[5] The problem is how they are to be achieved. If they are desirable, and it seems to me there can be but little question on that score, the medical profession should take the leadership in their development. The maintenance of the hospitals with their varied activities is merely a matter of adequate taxation. The great problem is the position of the doctor under the new scheme, for if his income is derived from public or corporate funds he will become a public or corporate servant. It is against that phase of the social system which has been called State Medicine that the medical organizations have risen up in arms.

What are the objections of organized medicine? They fall mainly under three heads, bureaucracy, politics, and regimentation. As regards the first, the claim is made that if medical practice becomes even in part a state or a Federal function, it will involve the creation of a large and powerful bureaucracy. I need not here enter current polemics pro and con bureaucracy, a word that merely means a body of officials, although it has acquired a secondary—a propagandist meaning—a body of officials you don't like. To us in America, who change our national government every four years, and who have been brought up on the doctrine, not so strongly held now, that to the victor belong the spoils, the idea of a permanent body of officials not subject to change is to some extent obnoxious. We believe that any American on the outside is good enough to replace any other American on the inside. I have some knowledge of a Board of Trustees serving the State of Pennsylvania in an important capacity and

[5] They are not far different from those incorporated in *American Medicine, Expert Testimony Out of Court.* The American Foundation, New York, 1937. Editor Miss Esther Lape.

employing a highly devoted and competent staff. When the recent political upheaval placed the Democrats in power, one of the triumphant leaders inquired how many persons were employed by the Board. Upon learning, he asked, "Are they all Republicans?" Republican was once the prevailing color in Philadelphia. The official answered that no one had ever inquired into the politics of the workers. "Well," said the leader, who himself is a man both of integrity and of ability, "they are probably all Republicans and there must be good Democrats equally capable of doing the job and who therefore ought to be appointed."

In the various departments at Washington, particularly in the scientific bureaus with which medicine would be comparable, there is a bureaucracy (I should like to find a less irritating word) composed of excellent men whom any university would be proud to have on its staff. In England the permanent bureaucracies run the government, while the secretaries of state, the titular heads, come and go. In any governmental upheaval, hardly more than forty persons change, to be replaced by others.

Another objection to socialized medicine is the fear that the control of medical practice will fall into the hands of politicians. In certain localities, perhaps in all, that would be a real calamity. The medical profession would never be satisfied with political control. I cannot refrain, however, from saying in this connection a kind word for the politician. Having watched the political scene for a lifetime, I am convinced that the quality of public servants is improving. I have found them, as Lincoln Steffens did, possessed of a good deal of common sense and humanity. Like other people, they want a good name, and barring a few crass specimens, they are very sensitive to criticism.

But need the politicians control? If the medical profession seizes the right moment and takes the leadership in the present crisis, for a crisis it is, such organization as will be adopted to meet the new social orientation will be in their own hands. I should like the best minds in the medical and allied professions to get together and formulate a forward-looking plan, before legislators force upon the doctors one that would be injurious to the best interests of the public and the doctors. There is a real danger that this may happen.

The other word often heard in recent discussions is regimentation. The idea it conveys is galling to us, like "verboten," "Keep Off the Grass." No American with the traditions of Anglo-Saxon freedom would be willing to be regimented in the manner obtaining in countries under dictators. If the socialization of medicine demanded as its price regimentation on such a model, I should fight against it, but does it exact that price? I believe that the type of organization can be made similar to that of a hospital staff, which, whether chosen by the staff or by the hospital trustees, governs itself and performs its function without undue hindrance, regimentation or interference.

Another objection made by many conscientious physicians is that socialized medicine will destroy the relation of physician to patient which has prevailed since time immemorial between the family doctor and his patients. That relation had certain admirable qualities, but it applied mainly to curative medicine and had little bearing on preventive medicine. But even in the former it is fast disappearing in many fields. The patient is referred to a surgeon previously unknown to him; or to specialists; to experts in certain technical branches—electrocardiography, X-ray, basal metabolism, allergy. No close relationship is estab-

lished between the patient and these various doctors. The patient-doctor relationship is of unquestioned importance in the neuroses; to some extent in pediatrics and in obstetrics. In venereal diseases and in urology patients very often prefer to go to an unknown doctor rather than reveal their troubles to their family physician. Finally, the floating population, steadily increasing in this country, tends to work against the old fashioned doctor-patient relation.

A further objection has been made on the ground that a more socialized type of medicine deprives the patient of his free choice in consulting a doctor. This is closely related to the previous objection. At first sight that seems a weighty argument. Most of us are accustomed to choose our own doctor, dentist or lawyer. Yet the man who goes to a hospital or to a dispensary has no choice. He sees the doctor on duty; he may not see him on his next visit. He has the choice of going to another hospital or dispensary if he is an ambulant patient, but if he is in a hospital bed, a choice does not exist. Therefore, while it is desirable to retain the freedom of choice in as large a degree as possible, it is not so vital an element in the doctor-patient relation that a wise social plan should be sacrificed to it.

It has been claimed that socialized medicine will remove the stimulus to self-improvement inherent in the competitive system of practice. I believe that fear is not warranted. First, the main stimulus for self-advancement in knowledge always comes from within, and I have reason to believe that it is stronger in the American doctor than in any other. Secondly, there will always be, in any form of medical practice, strong external pressure, none stronger than the approbation of colleagues, expressed in respect, confidence, and in positions in medical societies. Further-

more, the medical journals by their process of selection of articles, exert a definite stimulus. Finally, there are the abundant postgraduate courses given throughout the land, which make the acquisition of new knowledge easy, besides providing good fellowship and relaxation.

Medical organizations have objected to the proposals for a larger social outlook in medicine because such proposals have come from laymen and to a considerable extent from representatives of wealthy foundations. Can that objection be sustained? There are 140,000 physicians in the United States and nearly 130,000,000 laymen who are as much concerned with the best methods of distributing good medical care as the doctors themselves. Can it surprise us that the spokesmen for this vast non-medical population are laymen? Moreover, laymen make our laws in other fields, our food and drug laws, tariff laws, laws of navigation, aviation, even our health laws. In minor directions we find the same lay domination. Thus in the two great democracies, the United States of America and Great Britain, the secretaries of war and of the navy are with rare exceptions laymen, and in the British cabinet the secretary of state for health is also a layman. Medical men cannot arrogate to themselves in addition to their traditional duties as healers of the sick the sole right to determine the mechanism by which medical care is to be distributed.

Despite much discussion, there is as yet no concrete plan by which adequate medical care is to be provided for all the people. The subject is surcharged with emotionalism, with misunderstandings both wilful and unintentional. All that is possible—at least, I find it so in my case—is to indicate directions, the evolutionary

trends that should guide us in our approach to so controversial a subject.

I have already referred to one direction, namely, the greater participation of the community or the state through taxation in supporting hospitals. Such a support will definitely have to be extended to medical schools, for private support is becoming more and more precarious; it is likely to be entirely inadequate in the near future. If hospitals and medical schools are to give the best service, they must be supported out of public funds. Since one of the greatest elements in the expense of good medical care, as I have intimated, is laboratory fees, a beginning of state support could be made advantageously in that direction both from the point of view of the public and of the experiment as a whole. State supported laboratories would make a small charge for their work so that doctors everywhere could avail themselves of the service. This would materially raise the level of rural practice and give to the patient far removed from a hospital the benefit of scientific medicine. In a large state branch laboratories might have to be established so as to reduce the time required for reports.

The public support of medical education should be twofold—for the medical schools in accordance with the quality, to a less extent, with the quantity of doctors turned out, and secondly, for capable, impecunious students for whom the cost of medical education is at the present time prohibitive. In other words, abundant scholarships for the worthy should be provided.

In this chapter I should make mention of the various concrete efforts that have been made to distribute good medical care to the people. One of the earliest is the so-called group clinic. This type of clinic is able

by virtue of its compact organization to distribute good medical care to a larger number of persons than would be reached if the individual doctors were practising independently. The advantages of a group clinic are the presence under one roof of various medical specialists as well as of fully equipped laboratories, such as no doctor practising alone could afford to maintain. The most famous group clinic and the pattern for all others is the Mayo Clinic in Rochester, Minnesota. Some of the group clinics have not only distributed medical care—curative, not preventive—but they have also engaged successfully in medical research and education, for which they deserve great praise.

Are there any disadvantages connected with the group clinic system? Yes. One is that the clinic is to a large extent impersonal; the patients usually come either on their own initiative or by reference of their family physician, and are sorted out at a receiving desk and then are sent through the various departments in a more or less routine fashion.

In some clinics the patients are routinely put through all the examinations and tests—in a hopper method—which is often unnecessary and being unnecessary, the doing of it is economically wasteful. In an overwhelming number of cases the diagnosis can be made by simple means.

Thirdly, the group clinic does not reduce the costs of medical care. In the nature of things, it is run for profit. The larger the overhead, the higher the fees demanded, although in some clinics by reason of the great afflux of patients, a relatively smaller composite fee is charged.

On the whole, however, the advantages of group clinics, provided the men composing them are experts in their field, far outweigh their disadvantages.

Group clinics exist that are organized mainly for diagnostic purposes. The patients who come to such clinics either on their own initiative or on the advice of a physician are referred back to their family doctor, if they have one, with the diagnosis arrived at and with full details of the treatment required. Some clinics of this type are connected with hospitals. Others are in private hands and are conducted for profit. There can be no objection whatsoever to the latter type of clinic if the doctors are capable, ethical, and in their charges reasonable.

The suggestion has been made that such diagnostic centers should be established under the United States Public Health Service in various parts of the country. In places where there are no hospitals and no laboratories, where the doctors by reason of number or training or both are inadequate for the needs of the people, the creation of such governmental diagnostic centers would seem to meet a great need, the acuteness of which cannot be appreciated by city dwellers. It may be possible—it ought to be possible—for the so-called medically backward states to do this work themselves. If Federal help is necessary a certain measure of Federal control would *ipso facto* be exercised. Such control would be distinctly advantageous, for it would standardize methods on a higher plane than local initiative could achieve unaided.

Some of the group clinics are organized on an insurance basis and contract to supply medical care of every kind to the insured. The latter often represent special industrial groups so that the plan is similar to that prevailing in certain fraternal lodges. Organized medicine has looked with disfavor on this type of so-called contract practice; it has also in some states run afoul of the insurance laws. The best known of these

groups is Group Health Association, Inc., which was organized in Washington by 2,500 government employees, principally from the lower salary classes, to provide prepaid medical care at a cost which the members could afford to pay. The group engages its own physicians who undertake to provide the members with virtually complete medical care. The District of Columbia Medical Society, with the moral support of the American Medical Association, has bitterly fought this plan—it has expelled the doctors affiliated with the Group and has made it next to impossible for them to retain or obtain staff positions in good hospitals. This attitude has led the Department of Justice to invoke the antitrust laws against the District of Columbia Medical Society and the American Medical Association on the ground that these bodies attempt to prevent qualified doctors from carrying on their calling and members of Group Health Association from selecting physicians of their own choice. In the verbal turmoil that followed this sensational action of the government, the great achievements of organized medicine were largely forgotten.

Another form of group insurance is the popular Group Hospitalization plan in which a number of hospitals join together and offer, for the periodic payment of a small sum, usually about three cents a day, to provide semiprivate hospitalization for a period of twenty-one days in any one year for the insured. For a slight addition, the privilege is extended to the family. The insured is not obliged to go to the hospital with which his contract was made, but has his choice; he may even in case of emergency enter a hospital in another city. While hospitalization is the primary object of the plan, there has arisen a demand for the inclusion of certain

medical services—anesthesia, limited X-ray and routine laboratory studies.

To this extension of the plan the organized medical profession has voiced a vigorous protest, on the ground that it is "selling medical service by a nonmedical body," and is both illegal and unethical. It is difficult to say whether this opposition has a just basis; at any rate some compromise will have to be reached, for the public will be much more willing to insure if a certain amount of necessary and routine medical studies is included. As far as the hospitals are concerned, they have shown an eagerness to make that inclusion. After all, routine laboratory work, blood transfusions, electrocardiograms, basal metabolism and anesthesia and in many hospitals, X-ray studies, are put in the hospital bill and are not paid directly to those who render the service and are often unknown to the patient.

The advantage of the plan, aside from its low cost is that it reserves to the patient the choice of physician and that by lessening his expenditures for hospital charges, it enables him to pay his physician a fee and thus preserves his self-respect.

Group hospitalization is spreading rapidly through the country—it may be the solution of the problem of curative medical care for a large section of the population. The more important problem of preventive care is, however, not touched by the plan. For that a larger scheme of health insurance would seem to offer the only practical solution.

Within the last year, as already mentioned, a group of well known physicians have taken the reins in their own hands and have proposed plans looking toward the end that adequate medical care may be made universally available. Beginning with 430 signers of the original manifesto, the number of sponsors of "The

Principles and Proposals" is now not far from a thousand. While 1,000 is a small fraction of 140,000—the number of physicians in the United States—it must be remembered that every revolution in history began with a numerically insignificant minority.

The most definite proposal for making good medical care available to a large proportion of the population is that of health insurance. I have already referred to this in speaking of the socialized systems in vogue in a number of European countries. In Russia medicine is so wholly a state function, like education, that insurance is superfluous. In England the panel system is based on the insurance principle and is maintained by contributions from the insured, the employer, and the government. Those who in this country have taken an advanced position on the great question of social security also advocate a health insurance system. In this movement the national administration has taken an active part, in a sense a leading part. The state of New York at this writing is considering the incorporation of an article in its new Constitution legalizing public health insurance against sickness.

For the middle class, for the vast stratum between the ultra rich and the ultra poor, some form of health insurance would seem the best solution—insurance comparable to fire, accident and automobile insurance. Such health insurance should not be instituted for personal profit. There should be no shares that might be accumulated by "economic royalists" who thereby would gain control of the corporation. The ultimate control should rest with the organized medical profession. There would need to be some type of actuarial bureaucracy, but no politician whether medical or lay should dominate.

Can that be achieved? A profession that has elevated the standards of medical education to a level unequalled in the civilized world, has regulated hospitals until today no nation can match ours, publishes the best medical journal in existence together with many other works that serve to educate the American physician; brings together annually thousands of doctors from all over the land for a week of intensive postgraduate study which is a model for the world—such an Association can I think be trusted to collaborate with socially minded laymen toward a plan for distributing medical care, both curative and preventive, to all the people.

It must be admitted that up to the present the organized medical profession has been rather backward in this movement, seeing all sorts of specters and bugaboos in the plans proposed. The time has come, however, when the organized profession must cease its attitude of laissez-faire and of destructive criticism, of being merely the opposition party rising to say "I object." It must take the lead in the inevitable movement of reform. If it fails to lead, then it will be obliged to follow those who have neither the knowledge, the wisdom, nor the incentive to preserve what is best in American medicine.

CHAPTER FIFTEEN

THE TASK FOR INTELLIGENCE

MAN is but a grain of sand in the Universe. He is so small that philosophers and theologians from time immemorial have emphasized his cosmic insignificance. Man, however, has a brain and although it weighs less than three pounds and is nearly 75 per cent water, he has made himself by means of it master of the universe. He is not infinitesimally small but incomprehensibly big—"in apprehension how like a God." Does he not weigh the stars and determine their composition? Does he not know the motion of the planets as accurately as if he himself moved them? Does he not with his prolonged eye, the telescope, plumb the depths of space to an unnamable distance, and does he not penetrate into the invisible interior of matter to look for the elusive electron? With only his little brain to help him he sends his spoken word around the earth and his image across space on the wings of nothing. A creature that can do all that and more starting as they say in sport "from scratch" is not to be despised. The spirit of man has no limits and "his reach must ever be greater than his grasp, else what's a heaven for?"

This apotheosis of man is not to be interpreted as vanity—man has no right to be vain, although he has

some right to be proud. Vanity would be out of place even though he has accomplished much for there is infinitely more to do. I might without exaggeration say that the things yet undone are of astronomical proportions, while man's present accomplishments are atomic in size. Materially man has advanced to a dizzy height, morally he is still very small. Poverty, disease and hate, they are the unfulfilled tasks to which man has not yet rationally or adequately applied himself. In his devotion to mechanical progress he has forgotten that there is another kind of progress, ethical progress, which is more important, more fundamental.

Hate rules the world today as it never did before. It is preached by those in power and is instilled into the minds of children. Ten thousand years of travail toward a real civilization are as naught. Hate breeds war and preparation for war, with the people paying with their sweat and blood the cost for the preparation, and when war comes civilization pays the price not only in the present but for ages to come.

Poverty is an anomaly, a paradox, for the earth is fruitful and man's machines vastly productive. There would be no poverty if it were not for man's stupidity. When I saw the starving people in the picture of *The Good Earth*, I thought what a tragedy to let people starve when elsewhere in the world there is a surplus of food. But poverty and starvation are not the cruel privilege of the antipodes alone, they are also found in our own land because of lack of intelligence. During the war we learned economy to prevent waste, but how quickly the world has forgotten that and nearly all the other good lessons of the war. The bad ones it has not forgotten.

The eradication of needless poverty and want would do away with much disease. The young children would

have a better start in life and would be better physically as well as morally. Need we have the poor always with us? I do not believe it, and with poverty removed the world will be "from fear set free" and a hand will be uplifted over hate.

Joseph Goebbels has said "War is the most simple affirmation of life. Suppress war and it would be like trying to suppress the processes of nature." This attitude, characteristic of the cave man, leaves out of account man's ethical and spiritual nature. It is also blind to the futility of war as an instrument for the adjustment of differences between nations. No advance toward a higher civilization can be achieved through explosives or poison gases. While science has created these destructive instruments of war, scientific men free to express themselves are opposed to the use of their inventions for the destruction of civilization. The scientist, however, is not a perfect human being; he is not a demigod—he has the faults of his time and of his people. As a rule, however, he is a sceptic as regards the ordinary affairs of men, a believer in the experimental method, in favor of kinetic action instead of static acquiescence. He is less influenced by propaganda and more by logic. He doubts slogans and distrusts panaceas.

There are some who think that the only way to save civilization is to suppress further advances in scientific knowledge. Such a plan is neither rational nor workable; scientific progress will go on like an avalanche by its own momentum. But the direction of human affairs must not be left to men of brute force. Scientific workers must strive for world wide solidarity in an effort to bring civilization to its senses. No science is by

nature more universal than medicine, none more concerned with saving human life. Therefore, medical men, it seems to me, are above all others obligated to spread the doctrine of peace on earth among men of good will. The old phraseology faith, hope and charity might for our generation be better rendered by faith, trust, and good will.

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